

Algebra II Regents Bimodal Worksheets

- 1 After Roger's surgery, his doctor administered pain medication in the following amounts in milligrams over four days.

Day (n)	1	2	3	4
Dosage (m)	2000	1680	1411.2	1185.4

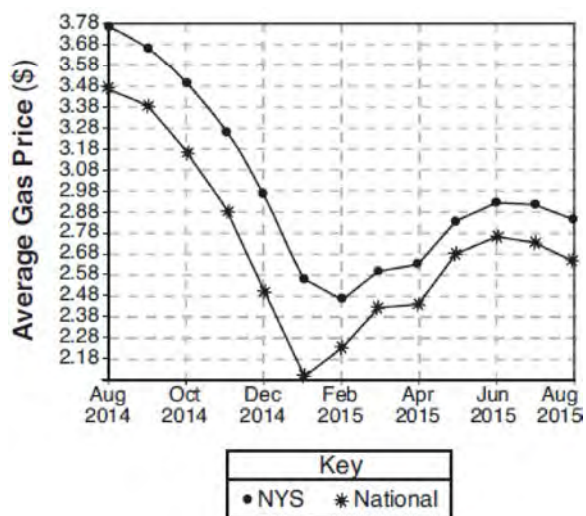
How can this sequence best be modeled recursively?

- 2 At her job, Pat earns \$25,000 the first year and receives a raise of \$1000 each year. The explicit formula for the n th term of this sequence is $a_n = 25,000 + (n - 1)1000$. Which rule best represents the equivalent recursive formula?
- 3 The sum of the first 20 terms of the series $-2 + 6 - 18 + 54 - \dots$ is
- 4 Judith puts \$5000 into an investment account with interest compounded continuously. Which approximate annual rate is needed for the account to grow to \$9110 after 30 years?
- 5 The graph of $y = \log_2 x$ is translated to the right 1 unit and down 1 unit. The coordinates of the x -intercept of the translated graph are
- 6 A parabola has a directrix of $y = 3$ and a vertex at $(2, 1)$. Which ordered pair is the focus of the parabola?
- 7 The solution set for the equation $\sqrt{3(x + 6)} = x$ is
- 8 The amount of a substance, $A(t)$, that remains after t days can be given by the equation $A(t) = A_0(0.5)^{\frac{t}{0.0803}}$, where A_0 represents the initial amount of the substance. An equivalent form of this equation is
- 9 Julia deposits \$2000 into a savings account that earns 4% interest per year. The exponential function that models this savings account is $y = 2000(1.04)^t$, where t is the time in years. Which equation correctly represents the amount of money in her savings account in terms of the monthly growth rate?
- 10 What is the solution set of the equation $\frac{4}{k^2 - 8k + 12} = \frac{k}{k - 2} + \frac{1}{k - 6}$?
- 11 On average, college seniors graduating in 2012 could compute their growing student loan debt using the function $D(t) = 29,400(1.068)^t$, where t is time in years. Which expression is equivalent to $29,400(1.068)^t$ and could be used by students to identify an approximate daily interest rate on their loans?

12 According to the USGS, an agency within the Department of Interior of the United States, the frog population in the U.S. is decreasing at the rate of 3.79% per year. A student created a model, $P = 12,150(0.962)^t$, to estimate the population in a pond after t years. The student then created a model that would predict the population after d decades. This model is best represented by

13 A 4th degree polynomial has zeros -5 , 3 , i , and $-i$. Which graph could represent the function defined by this polynomial?

14 The graph below represents national and New York State average gas prices.



If New York State's gas prices are modeled by $G(x)$ and $C > 0$, which expression best approximates the national average x months from August 2014?

15 If $f(x) = a^x$ where $a > 1$, then the inverse of the function is

16 The expression $\frac{x^2 + 6}{x^2 + 4}$ is equivalent to

17 Which expression is equivalent to $\frac{2x^3 + 2x - 7}{2x + 4}$?

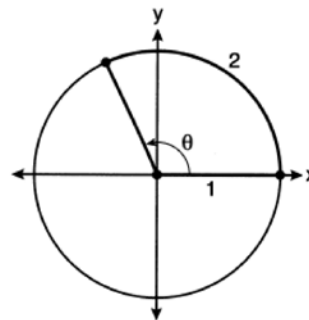
18 Kelly-Ann has \$20,000 to invest. She puts half of the money into an account that grows at an annual rate of 0.9% compounded monthly. At the same time, she puts the other half of the money into an account that grows continuously at an annual rate of 0.8%. Which function represents the value of Kelly-Ann's investments after t years?

19 Consider the system of equations below?

$$\begin{aligned} x + 2y - z &= 1 \\ -x - 3y + 2z &= 0 \\ 2x - 4y + z &= 10 \end{aligned}$$

What is the solution to the given system of equations?

20 An angle, θ , is rotated counterclockwise on the unit circle, with its terminal side in the second quadrant, as shown in the diagram below.



Which value represents the radian measure of angle θ ?

- 21 The populations of two small towns at the beginning of 2018 and their annual population growth rate are shown in the table below.

Town	Population	Annual Population Growth Rate
Jonesville	1240	6% increase
Williamstown	890	11% increase

Assuming the trend continues, approximately how many years after the beginning of 2018 will it take for the populations to be equal?

- 22 Stephanie found that the number of white-winged cross bills in an area can be represented by the formula $C = 550(1.08)^t$, where t represents the number of years since 2010. Which equation correctly represents the number of white-winged cross bills in terms of the monthly rate of population growth?

- 23 For the system shown below, what is the value of z ?

$$y = -2x + 14$$

$$3x - 4z = 2$$

$$3x - y = 16$$

- 24 What is the solution set of the equation

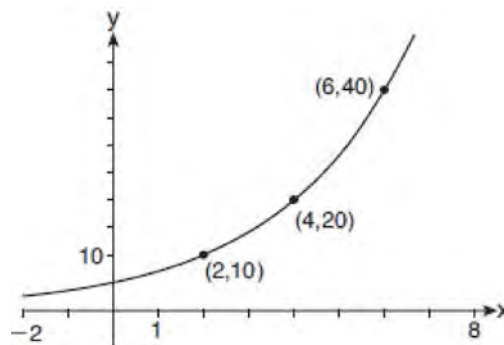
$$\frac{10}{x^2 - 2x} + \frac{4}{x} = \frac{5}{x - 2}?$$

- 25 For which values of x , rounded to the *nearest hundredth*, will $|x^2 - 9| - 3 = \log_3 x$?

- 26 Which expression is equivalent to

$$\frac{2x^4 + 8x^3 - 25x^2 - 6x + 14}{x + 6}?$$

- 27 The graph of $y = f(x)$ is shown below.



Which expression defines $f(x)$?

- 28 Given $c(m) = m^3 - 2m^2 + 4m - 8$, the solution of $c(m) = 0$ is

- 29 Written in simplest form, the fraction $\frac{x^3 - 9x}{9 - x^2}$, where $x \neq \pm 3$, is equivalent to

- 30 What is the solution set of the equation

$$\frac{2}{x} - \frac{3x}{x + 3} = \frac{x}{x + 3}?$$

- 31 A popular celebrity tracks the number of people, in thousands, who have followed her on social media since January 1, 2015. A summary of the data she recorded is shown in the table below:

Number of Months Since January 2015	2	11	16	20	27	35	47	50	52
Number of Social Media Followers (thousands)	3.1	7.5	29.7	49.7	200.3	680.3	5200.3	8109.3	12,107.1

The celebrity uses an exponential regression equation to model the data. According to the model, about how many followers did she have on June 1, 2018?

- 32 There are 440 students at Thomas Paine High School enrolled in U.S. History. On the April report card, the students' grades are approximately normally distributed with a mean of 79 and a standard deviation of 7. Students who earn a grade less than or equal to 64.9 must attend summer school. The number of students who must attend summer school for U.S. History is closest to

- 37 The solution set for the equation $b = \sqrt{2b^2 - 64}$ is

- 38 What is the solution for the system of equations below?

$$x + y + z = 2$$

$$x - 2y - z = -4$$

$$x - 9y + z = -18$$

- 33 What is the solution set of the equation

$$\frac{x+2}{x} + \frac{x}{3} = \frac{2x^2+6}{3x}?$$

- 34 Given the inverse function $f^{-1}(x) = \frac{2}{3}x + \frac{1}{6}$, which function represents $f(x)$?

- 39 Perry invested in property that cost him \$1500. Five years later it was worth \$3000, and 10 years from his original purchase, it was worth \$6000. Assuming the growth rate remains the same, which type of function could he create to find the value of his investment 30 years from his original purchase?

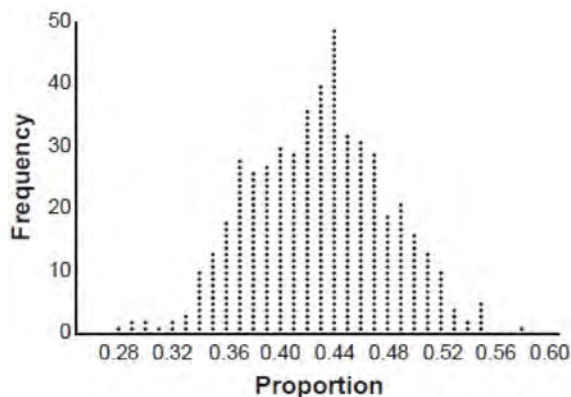
- 35 A recursive formula for the sequence 64, 48, 36, ... is

- 40 If $p(x) = 2x^3 - 3x + 5$, what is the remainder of $p(x) \div (x - 5)$?

- 36 Which equation represents a parabola with a focus of $(-2, 5)$ and a directrix of $y = 9$?

- 41 The solution set of $\frac{x+3}{x-5} + \frac{6}{x+2} = \frac{6+10x}{(x-5)(x+2)}$ is

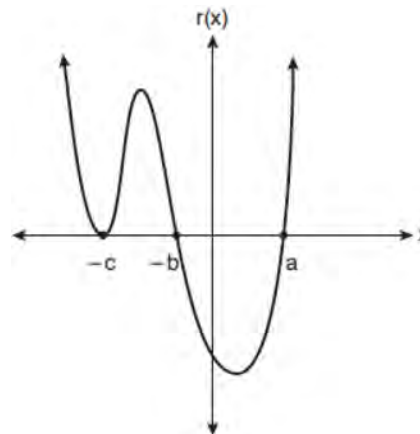
- 42 Marissa and Sydney are trying to determine if there is enough interest in their school to put on a senior musical. They randomly surveyed 100 members of the senior class and 43% of them said they would be interested in being in a senior musical. Marissa and Sydney then conducted a simulation of 500 more surveys, each of 100 seniors, assuming that 43% of the senior class would be interested in being in the musical. The output of the simulation is shown below.



The standard deviation of the simulation is closest to

- 43 Given $\cos \theta = \frac{7}{25}$, where θ is an angle in standard position terminating in quadrant IV, and $\sin^2 \theta + \cos^2 \theta = 1$, what is the value of $\tan \theta$?
- 44 When factoring to reveal the roots of the equation $x^3 + 2x^2 - 9x - 18 = 0$, which equations can be used?
- I. $x^2(x + 2) - 9(x + 2) = 0$
 - II. $x(x^2 - 9) + 2(x^2 - 9) = 0$
 - III. $(x - 2)(x^2 - 9) = 0$
- 45 The roots of the equation $x^2 - 4x = -13$ are

- 46 A sketch of $r(x)$ is shown below.



An equation for $r(x)$ could be

- 47 A manufacturing plant produces two different-sized containers of peanuts. One container weighs x ounces and the other weighs y pounds. If a gift set can hold one of each size container, which expression represents the number of gift sets needed to hold 124 ounces?
- 48 Which equation represents the equation of the parabola with focus $(-3, 3)$ and directrix $y = 7$?
- 49 A local university has a current enrollment of 12,000 students. The enrollment is increasing continuously at a rate of 2.5% each year. Which logarithm is equal to the number of years it will take for the population to increase to 15,000 students?
- 50 What is the equation of the directrix for the parabola $-8(y - 3) = (x + 4)^2$?

51 When a ball bounces, the heights of consecutive bounces form a geometric sequence. The height of the first bounce is 121 centimeters and the height of the third bounce is 64 centimeters. To the *nearest centimeter*, what is the height of the fifth bounce?

52 A parabola that has a vertex at $(2, 1)$ and a focus of $(2, -3)$ has an equation of

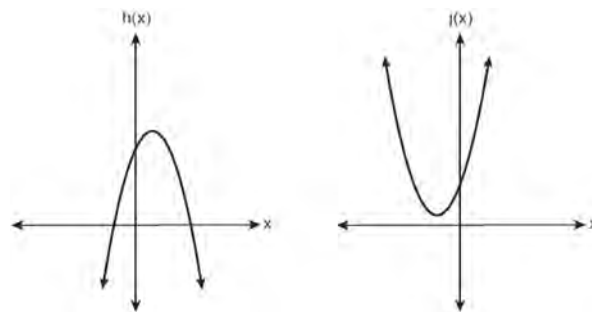
53 Mia has a student loan that is in deferment, meaning that she does not need to make payments right now. The balance of her loan account during her deferment can be represented by the function $f(x) = 35,000(1.0325)^x$, where x is the number of years since the deferment began. If the bank decides to calculate her balance showing a monthly growth rate, an approximately equivalent function would be

54 In a survey of people who recently bought a laptop, 45% said they were looking for a large screen, 31% said they were looking for a fast processor, and 58% said they wanted a large screen or a fast processor. If a survey respondent is selected at random, what is the probability that the respondent wanted both a large screen and a fast processor?

55 There are 400 students in the senior class at Oak Creek High School. All of these students took the SAT. The distribution of their SAT scores is approximately normal. The number of students who scored within 2 standard deviations of the mean is approximately

56 The completely factored form of $n^4 - 9n^2 + 4n^3 - 36n - 12n^2 + 108$ is

57 In the quadratic formula, $b^2 - 4ac$ is called the discriminant. The function $f(x)$ has a discriminant value of 8, and $g(x)$ has a discriminant value of -16 . The quadratic graphs, $h(x)$ and $j(x)$, are shown below.



Which quadratic functions have imaginary roots?

58 The half-life of iodine-131 is 8 days. The percent of the isotope left in the body d days after being introduced is $I = 100\left(\frac{1}{2}\right)^{\frac{d}{8}}$. When this equation is written in terms of the number e , the base of the natural logarithm, it is equivalent to $I = 100e^{kd}$. What is the approximate value of the constant, k ?

59 The terminal side of θ , an angle in standard position, intersects the unit circle at $P\left(-\frac{1}{3}, -\frac{\sqrt{8}}{3}\right)$.

What is the value of $\sec \theta$?

60 What is the total number of points of intersection of the graphs of the equations $y = e^x$ and $xy = 20$?

61 The expression $\frac{9x^2 - 2}{3x + 1}$ is equivalent to

62 If $\cos A = \frac{\sqrt{5}}{3}$ and $\tan A < 0$, what is the value of $\sin A$?

63 Brian deposited 1 cent into an empty non-interest bearing bank account on the first day of the month. He then additionally deposited 3 cents on the second day, 9 cents on the third day, and 27 cents on the fourth day. What would be the total amount of money in the account at the end of the 20th day if the pattern continued?

64 Chet has \$1200 invested in a bank account modeled by the function $P(n) = 1200(1.002)^n$, where $P(n)$ is the value of his account, in dollars, after n months. Chet's debt is modeled by the function $Q(n) = 100n$, where $Q(n)$ is the value of debt, in dollars, after n months. After n months, which function represents Chet's net worth, $R(n)$?

65 Susan won \$2,000 and invested it into an account with an annual interest rate of 3.2%. If her investment were compounded monthly, which expression best represents the value of her investment after t years?

66 What is the inverse of the function $y = 4x + 5$?

67 Camryn puts \$400 into a savings account that earns 6% annually. The amount in her account can be modeled by $C(t) = 400(1.06)^t$ where t is the time in years. Which expression best approximates the amount of money in her account using a weekly growth rate?

68 If $\cos \theta = -\frac{3}{4}$ and θ is in Quadrant III, then $\sin \theta$ is equivalent to

69 The equation below can be used to model the height of a tide in feet, $H(t)$, on a beach at t hours.

$$H(t) = 4.8 \sin\left(\frac{\pi}{6}(t+3)\right) + 5.1$$

Using this function, the amplitude of the tide is

70 The expression $\frac{x^2 + 12}{x^2 + 3}$ can be rewritten as

71 The expression $6 - (3x - 2i)^2$ is equivalent to

72 A number, minus twenty times its reciprocal, equals eight. The number is

73 Consider the probability statements regarding events A and B below.

$$P(A \text{ or } B) = 0.3;$$

$$P(A \text{ and } B) = 0.2; \text{ and}$$

$$P(A|B) = 0.8$$

What is $P(B)$?

74 For which approximate value(s) of x will $\log(x + 5) = |x - 1| - 3$?

75 What is the solution set of the equation

$$\frac{2}{3x+1} = \frac{1}{x} - \frac{6x}{3x+1}?$$

76 Where i is the imaginary unit, the expression $(x + 3i)^2 - (2x - 3i)^2$ is equivalent to

77 Which value, to the *nearest tenth*, is the *smallest* solution of $f(x) = g(x)$ if $f(x) = 3 \sin\left(\frac{1}{2}x\right) - 1$ and $g(x) = x^3 - 2x + 1$?

78 For all real values of x , if $f(x) = (x - 3)^2$ and $g(x) = (x + 3)^2$, what is $f(x) - g(x)$?

79 The roots of the equation $3x^2 + 2x = -7$ are

80 The inverse of $f(x) = -6x + \frac{1}{2}$ is

81 For all values of x for which the expression is defined, $\frac{x^3 + 2x^2 - 9x - 18}{x^3 - x^2 - 6x}$, in simplest form, is equivalent to

82 Expressed in simplest $a + bi$ form, $(7 - 3i) + (x - 2i)^2 - (4i + 2x^2)$ is

83 The average depreciation rate of a new boat is approximately 8% per year. If a new boat is purchased at a price of \$75,000, which model is a recursive formula representing the value of the boat n years after it was purchased?

84 Written in simplest form, $\frac{c^2 - d^2}{d^2 + cd - 2c^2}$ where $c \neq d$, is equivalent to

85 Stone Manufacturing has developed a cost model, $C(x) = 0.18x^3 + 0.02x^2 + 4x + 180$, where x is the number of sprockets sold, in thousands. The sales price can be modeled by $S(x) = 95.4 - 6x$ and the company's revenue by $R(x) = x \cdot S(x)$. The company's profits, $R(x) - C(x)$, could be modeled by

86 The Fahrenheit temperature, $F(t)$, of a heated object at time t , in minutes, can be modeled by the function below. F_s is the surrounding temperature, F_0 is the initial temperature of the object, and k is a constant.

$$F(t) = F_s + (F_0 - F_s)e^{-kt}$$

Coffee at a temperature of 195°F is poured into a container. The room temperature is kept at a constant 68°F and $k = 0.05$. Coffee is safe to drink when its temperature is, at most, 120°F. To the *nearest minute*, how long will it take until the coffee is safe to drink?

87 Audra is interested in studying the number of students entering kindergarten in the Ahlville Central School District over the next several years. Using data dating back to 2015, she determines that the number of kindergarteners is decreasing at an exponential rate. She creates a formula to model this situation $y = a(b)^x$, where x is the number of years since 2015 and y is the number of students entering kindergarten. If there were 105 students entering kindergarten in Ahlville in 2015, which statement about Audra's formula is true?

- 88 The table below shows the food preferences of sports fans whose favorite sport is football or baseball.

Favorite Food to Eat While Watching Sports

	Wings	Pizza	Hot Dogs
Football	14	20	6
Baseball	6	12	42

The probability that a fan prefers pizza given that the fan prefers football is

- 89 Which equation represents a parabola with a focus of $(4, -3)$ and directrix of $y = 1$?
- 90 The average monthly temperature, $T(m)$, in degrees Fahrenheit, over a 12 month period, can be modeled by $T(m) = -23 \cos\left(\frac{\pi}{6} m\right) + 56$, where m is in months. What is the range of temperatures, in degrees Fahrenheit, of this function?
- 91 If $x - 1$ is a factor of $x^3 - kx^2 + 2x$, what is the value of k ?
- 92 What is the solution set of the following system of equations?
 $y = 3x + 6$
 $y = (x + 4)^2 - 10$
- 93 The scores on a mathematics college-entry exam are normally distributed with a mean of 68 and standard deviation 7.2. Students scoring higher than one standard deviation above the mean will not be enrolled in the mathematics tutoring program. How many of the 750 incoming students can be expected to be enrolled in the tutoring program?
- 94 What is the solution when the equation $wx^2 + w = 0$ is solved for x , where w is a positive integer?
- 95 If $f(t) = 50(.5)^{\frac{t}{5715}}$ represents a mass, in grams, of carbon-14 remaining after t years, which statement(s) must be true?
I. The mass of the carbon-14 is decreasing by half each year.
II. The mass of the original sample is 50 g.
- 96 The height above ground for a person riding a Ferris wheel after t seconds is modeled by $h(t) = 150 \sin\left(\frac{\pi}{45} t + 67.5\right) + 160$ feet. How many seconds does it take to go from the bottom of the wheel to the top of the wheel?
- 97 The first term of a geometric sequence is 8 and the fourth term is 216. What is the sum of the first 12 terms of the corresponding series?
- 98 The weights of bags of Graseck's Chocolate Candies are normally distributed with a mean of 4.3 ounces and a standard deviation of 0.05 ounces. What is the probability that a bag of these chocolate candies weighs less than 4.27 ounces?

99 How many equations below are identities?

- $x^2 + y^2 = (x^2 - y^2) + (2xy)^2$
- $x^3 + y^3 = (x - y) + (x^2 - xy + y^2)$
- $x^4 + y^4 = (x - y)(x - y)(x^2 + y^2)$

100 The George family would like to borrow \$45,000 to purchase a new boat. They qualified for a loan with an annual interest rate of 6.75%. The monthly loan payment can be found using the formula below.

$$M = \frac{P\left(\frac{r}{12}\right)\left(1 + \frac{r}{12}\right)^n}{\left(1 + \frac{r}{12}\right)^n - 1}$$

M = monthly payment

P = amount borrowed

r = annual interest rate

n = number of monthly payments

What is the monthly payment if they would like to pay off the loan in five years?

101 The solutions to the equation $5x^2 - 2x + 13 = 9$ are

102 The expression $\left(a^3\sqrt{2b^2}\right)\left(\sqrt[3]{4a^2b}\right)$ is equivalent to

103 If the focus of a parabola is (0,6) and the directrix is $y = 4$, what is an equation for the parabola?

104 Given $f(x) = \frac{1}{2}x + 8$, which equation represents the inverse, $g(x)$?

105 A fast-food restaurant analyzes data to better serve its customers. After its analysis, it discovers that the events D , that a customer uses the drive-thru, and F , that a customer orders French fries, are independent. The following data are given in a report:

$$P(F) = 0.8$$

$$P(F \cap D) = 0.456$$

Given this information, $P(F|D)$ is

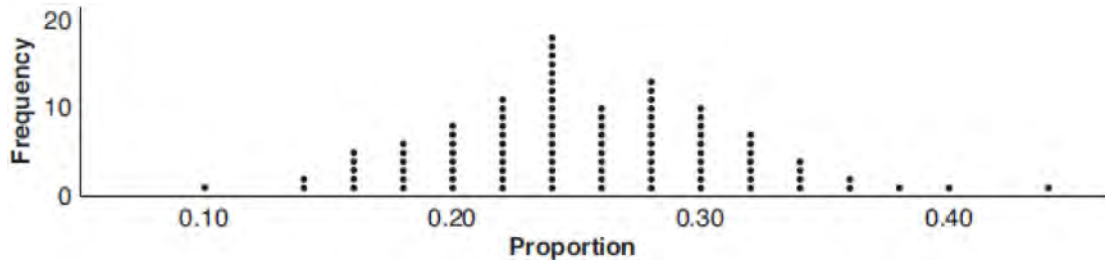
106 The solution of $87e^{0.3x} = 5918$, to the *nearest thousandth*, is

107 A retailer advertises that items will be discounted by 10% every Monday until they are sold. In how many weeks will an item costing \$50 first be sold for under half price?

108 The mean intelligence quotient (IQ) score is 100, with a standard deviation of 15, and the scores are normally distributed. Given this information, the approximate percentage of the population with an IQ greater than 130 is closest to

109 The heights of the students at Central High School can be modeled by a normal distribution with a mean of 68.1 and a standard deviation of 3.4 inches. According to this model, approximately what percent of the students would have a height less than 60 inches or greater than 75 inches?

- 110 A group of students was trying to determine the proportion of candies in a bag that are blue. The company claims that 24% of candies in bags are blue. A simulation was run 100 times with a sample size of 50, based on the premise that 24% of the candies are blue. The approximately normal results of the simulation are shown in the dot plot below.



The simulation results in a mean of 0.254 and a standard deviation of 0.060. Based on this simulation, what is a plausible interval containing the middle 95% of the data?

- 111 If $f(x) = \log_3 x$ and $g(x)$ is the image of $f(x)$ after a translation five units to the left, which equation represents $g(x)$?

- 116 Luminescence is the emission of light that is not caused by heat. A luminescent substance decays according to the function below.

$$I = I_0 e^{3\left(\frac{t}{0.6}\right)}$$

- 112 The solutions to $x + 3 - \frac{4}{x-1} = 5$ are

This function can be best approximated by

- 113 Which expression is equivalent to $\frac{x^3 - 2}{x - 2}$?

- 117 The expression $\frac{x^4 - 5x^2 + 4x + 14}{x + 2}$ is equivalent to

- 114 If θ is an angle in standard position whose terminal side passes through the point $(-2, -3)$, what is the numerical value of $\tan \theta$?

- 118 The growth of a \$500 investment can be modeled by the function $P(t) = 500(1.03)^t$, where t represents time in years. In terms of the monthly rate of growth, the value of the investment can be best approximated by

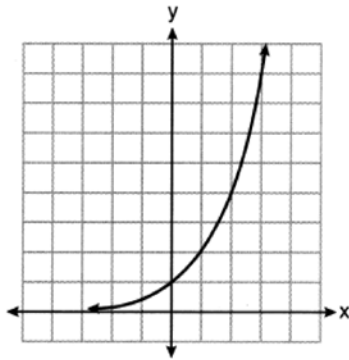
- 115 On a given school day, the probability that Nick oversleeps is 48% and the probability he has a pop quiz is 25%. Assuming these two events are independent, what is the probability that Nick oversleeps and has a pop quiz on the same day?

- 119 What is the quotient when $10x^3 - 3x^2 - 7x + 3$ is divided by $2x - 1$?

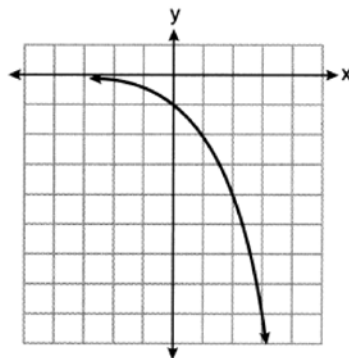
120 What is the value of $\tan \theta$ when $\sin \theta = \frac{2}{5}$ and θ is in quadrant II?

121 A study of black bears in the Adirondacks reveals that their population can be represented by the function $P(t) = 3500(1.025)^t$, where t is the number of years since the study began. Which function is correctly rewritten to reveal the monthly growth rate of the black bear population?

122 Consider the function $y = h(x)$, defined by the graph below.



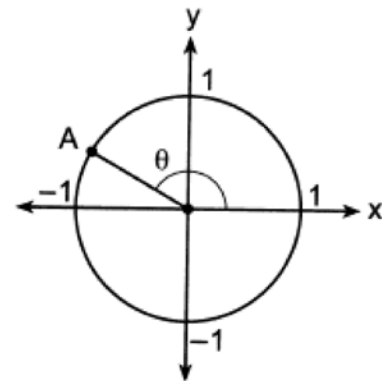
Which equation could be used to represent the graph shown below?



123 In a group of 40 people, 20 have brown hair, 22 have blue eyes, and 15 have both brown hair and blue eyes. How many people have neither brown hair nor blue eyes?

124 When the expression $(x + 2)^2 + 4(x + 2) + 3$ is rewritten as the product of two binomials, the result is

125 In the diagram of a unit circle below, point A, $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$, represents the point where the terminal side of θ intersects the unit circle.



What is $m\angle\theta$?

126 Consider the following patterns:

I. 16, -12, 9, -6.75, ...

II. 1, 4, 9, 16, ...

III. 6, 18, 30, 42, ...

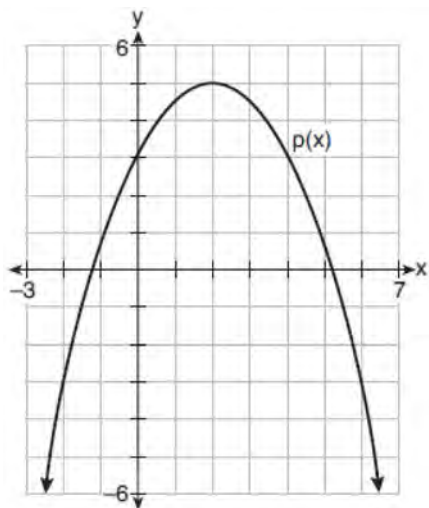
IV. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots$

Which pattern is geometric?

127 For all values of x for which the expression is defined, $\frac{x^2 + 3x}{x^2 + 5x + 6}$ is equivalent to

128 The function $N(t) = 100e^{-0.023t}$ models the number of grams in a sample of cesium-137 that remain after t years. On which interval is the sample's average rate of decay the fastest?

129 Consider $f(x) = 4x^2 + 6x - 3$, and $p(x)$ defined by the graph below.



The difference between the values of the maximum of p and minimum of f is

130 Which statement(s) are true for all real numbers?

- I $(x - y)^2 = x^2 + y^2$
 II $(x + y)^3 = x^3 + 3xy + y^3$

131 The expression $3i(ai - 6i^2)$ is equivalent to

132 The temperature, in degrees Fahrenheit, in Times Square during a day in August can be predicted by the function $T(x) = 8\sin(0.3x - 3) + 74$, where x is the number of hours after midnight. According to this model, the predicted temperature, to the nearest degree Fahrenheit, at 7 P.M. is

133 Which expression(s) are equivalent to $\frac{x^2 - 4x}{2x}$, where $x \neq 0$?

- I. $\frac{x}{2} - 2$ II. $\frac{x-4}{2}$ III. $\frac{x-1}{2} - \frac{3}{2}$

134 What is the solution set for x in the equation below?

$$\sqrt{x+1} - 1 = x$$

135 If a solution of $2(2x - 1) = 5x^2$ is expressed in simplest $a + bi$ form, the value of b is

136 Given $f(x) = x^4 - x^3 - 6x^2$, for what values of x will $f(x) > 0$?

137 The parabola described by the equation

$y = \frac{1}{12}(x - 2)^2 + 2$ has the directrix at $y = -1$. The focus of the parabola is

138 The heights of the 3300 students at Oceanview High School are approximately normally distributed with a mean of 65.5 inches and a standard deviation of 2.9 inches. The number of students at Oceanview who are between 64 and 68 inches tall is closest to

139 Consider the data in the table below.

	Right Handed	Left Handed
Male	87	13
Female	89	11

What is the probability that a randomly selected person is male given the person is left handed?

140 Selected values for the functions f and g are shown in the tables below.

x	$f(x)$		x	$g(x)$
-3.12	-4.88		-2.01	-1.01
0	-6		0	0.58
1.23	-4.77		8.52	2.53
8.52	2.53		13.11	3.01
9.01	3.01		16.52	3.29

A solution to the equation $f(x) = g(x)$ is

141 To the *nearest tenth*, the solution to the equation $4300e^{0.07x} - 123 = 5000$ is

145 A population is normally distributed with a mean of 23 and a standard deviation of 1.2. The percentage of the population that falls below 21, to the *nearest hundredth*, is

142 Given $x \neq -3$, the expression $\frac{2x^3 + 7x^2 - 3x - 25}{x + 3}$ is equivalent to

146 What is the inverse of $f(x) = \frac{x}{x+2}$, where $x \neq -2$?

143 The function $N(x) = 90(0.86)^x + 69$ can be used to predict the temperature of a cup of hot chocolate in degrees Fahrenheit after x minutes. What is the approximate average rate of change of the temperature of the hot chocolate, in degrees per minute, over the interval $[0, 6]$?

147 After examining the functions $f(x) = \ln(x+2)$ and $g(x) = e^{x-1}$ over the interval $(-2, 3]$, Lexi determined that the correct number of solutions to the equation $f(x) = g(x)$ is

144 If $ae^{bt} = c$, where a , b , and c are positive, then t equals

148 What is the inverse of $f(x) = -6(x-2)$?

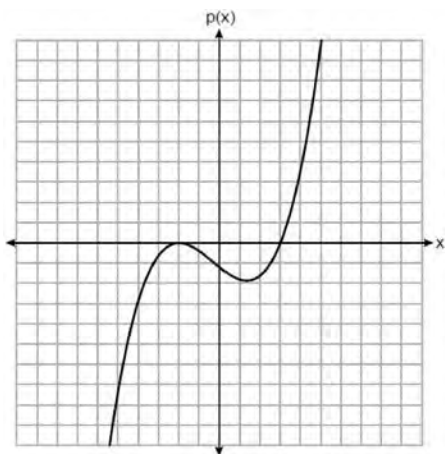
- 149 Sodium iodide-131, used to treat certain medical conditions, has a half-life of 1.8 hours. The data table below shows the amount of sodium iodide-131, rounded to the nearest thousandth, as the dose fades over time.

Number of Half Lives	1	2	3	4	5
Amount of Sodium Iodide-131	139.000	69.500	34.750	17.375	8.688

What approximate amount of sodium iodide-131 will remain in the body after 18 hours?

- 150 The hours of daylight, y , in Utica in days, x , from January 1, 2013 can be modeled by the equation $y = 3.06\sin(0.017x - 1.40) + 12.23$. How many hours of daylight, to the *nearest tenth*, does this model predict for February 14, 2013?

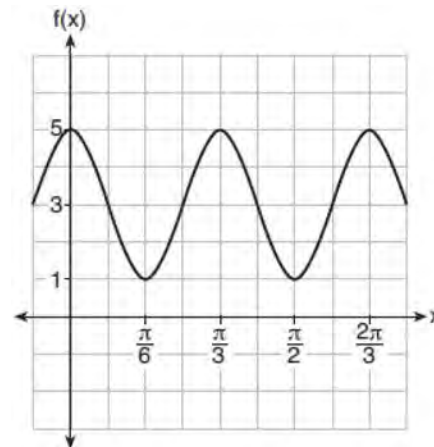
- 151 The graph of a cubic polynomial function $p(x)$ is shown below.



If $p(x)$ is written as a product of linear factors, which factor would appear twice?

- 152 Which expression is equivalent to $(x + 2)^2 - 5(x + 2) + 6$?

- 153 The function $f(x) = a \cos bx + c$ is plotted on the graph shown below.



What are the values of a , b , and c ?

- 154 If $f(x) = 12x - 4$, then the inverse function $f^{-1}(x)$ is

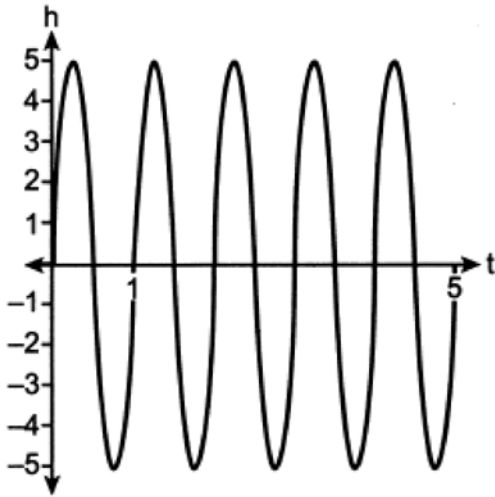
- 155 What are the solution(s) to the system of equations shown below?

$$x^2 + y^2 = 5$$

$$y = 2x$$

156 If $(a^3 + 27) = (a + 3)(a^2 + ma + 9)$, then m equals

157 A cyclist pedals a bike at a rate of 60 revolutions per minute. The height, h , of a pedal at time t , in seconds, is plotted below.



The graph can be modeled by the function $h(t) = 5 \sin(kt)$, where k is equal to

158 Given x and y are positive, which expressions are equivalent to $\frac{x^3}{y}$?

- I. $\left(\frac{y}{x^3}\right)^{-1}$ II. $\sqrt[3]{x^9}(y^{-1})$ III. $\frac{x^{64}\sqrt[4]{y^8}}{x^3y^3}$

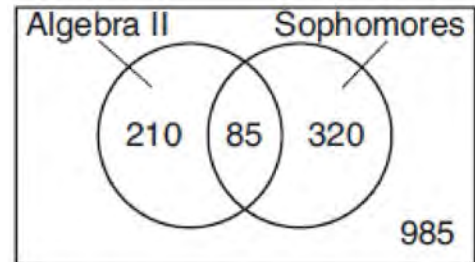
159 The element Americium has a half-life of 25 minutes. Given an initial amount, A_0 , which expression could be used to determine the amount of Americium remaining after t minutes?

160 If \$5000 is put into a savings account that pays 3.5% interest compounded monthly, how much money, to the nearest ten cents, would be in that account after 6 years, assuming no money was added or withdrawn?

161 How many solutions exist for $\frac{1}{1-x^2} = -|3x-2| + 5$?

162 A function is defined as $a_n = a_{n-1} + \log_{n+1}(n-1)$, where $a_1 = 8$. What is the value of a_3 ?

163 Data for the students enrolled in a local high school are shown in the Venn diagram below.

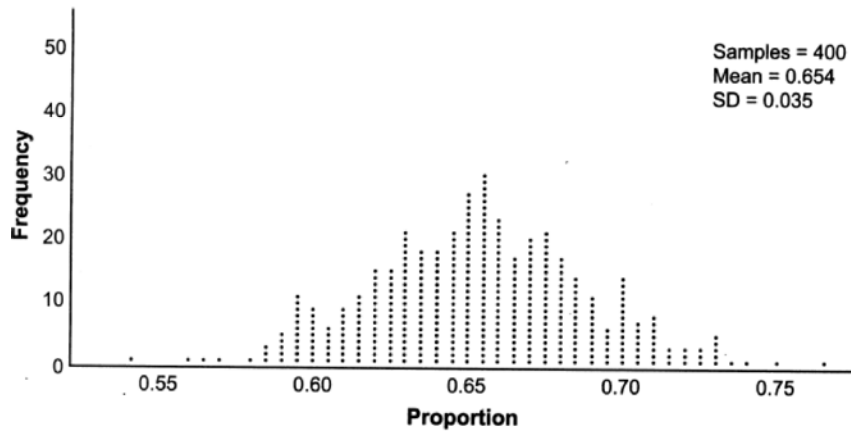


If a student from the high school is selected at random, what is the probability that the student is a sophomore given that the student is enrolled in Algebra II?

164 The solution to the equation $5e^{x+2} = 7$ is

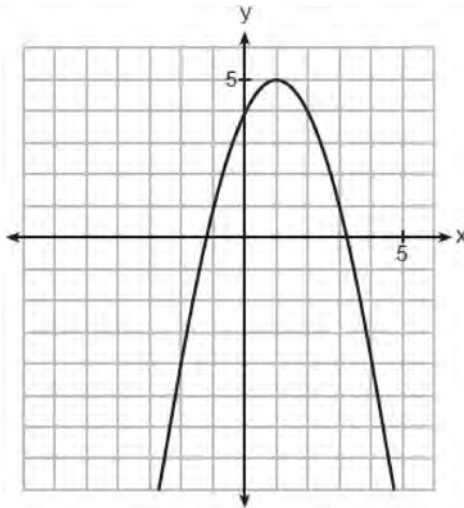
165 Which expression is equivalent to $(x + yi)(x^2 - xyi - y^2)$, where i is the imaginary unit?

166 Betty conducted a survey of her class to see if they like pizza. She gathered 200 responses and 65% of the voters said they did like pizza. Betty then ran a simulation of 400 more surveys, each with 200 responses, assuming that 65% of the voters would like pizza. The output of the simulation is shown below.



Considering the middle 95% of the data, what is the margin of error for the simulation?

167 The graph of a quadratic function is shown below.



When the graph of $x + y = 4$ is drawn on the same axes, one solution to this system is

168 Given that i is the imaginary unit, the expression $(x - 2i)^2$ is equivalent to

169 Monthly mortgage payments can be found using the formula below, where M is the monthly payment, P is the amount borrowed, r is the annual interest rate, and n is the total number of monthly payments.

$$M = \frac{P \left(\frac{r}{12} \right) \left(1 + \frac{r}{12} \right)^n}{\left(1 + \frac{r}{12} \right)^n - 1}$$

If Adam takes out a 15-year mortgage, borrowing \$240,000 at an annual interest rate of 4.5%, his monthly payment will be

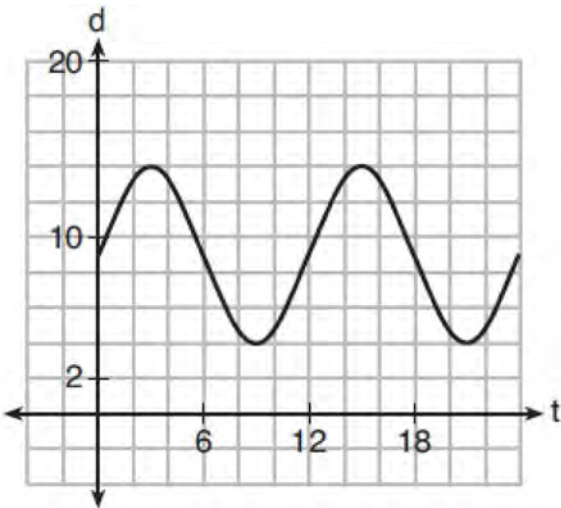
170 The function below models the average price of gas in a small town since January 1st.

$$G(t) = -0.0049t^4 + 0.0923t^3 - 0.56t^2 + 1.166t + 3.23,$$

where $0 \leq t \leq 10$.

If $G(t)$ is the average price of gas in dollars and t represents the number of months since January 1st, the absolute maximum $G(t)$ reaches over the given domain is about

- 171 The depth of the water at a marker 20 feet from the shore in a bay is depicted in the graph below.



If the depth, d , is measured in feet and time, t , is measured in hours since midnight, what is an equation for the depth of the water at the marker?

- 172 The profit function, $p(x)$, for a company is the cost function, $c(x)$, subtracted from the revenue function, $r(x)$. The profit function for the Acme Corporation is $p(x) = -0.5x^2 + 250x - 300$ and the revenue function is $r(x) = -0.3x^2 + 150x$. The cost function for the Acme Corporation is

- 173 The value(s) of x that satisfy

$$\sqrt{x^2 - 4x - 5} = 2x - 10 \text{ are}$$

- 174 If $f(x) = \frac{1}{2}x + 2$, then the inverse function is

- 175 If $p(x) = 2\ln(x) - 1$ and $m(x) = \ln(x + 6)$, then what is the solution for $p(x) = m(x)$?

- 176 What is the inverse of $f(x) = x^3 - 2$?

- 177 What are the zeros of $s(x) = x^4 - 9x^2 + 3x^3 - 27x - 10x^2 + 90$?

- 178 Which equation has roots of $3 + i$ and $3 - i$?

- 179 How many real solutions exist for the system of equations below?

$$y = \frac{1}{4}x - 8$$

$$y = \frac{1}{2}x^2 + 2x$$

- 180 A recursive formula for the sequence 40, 30, 22.5, ... is

- 181 If $f(x) = (x^2 + 3x + 2)(x^2 - 4x + 3)$ and $g(x) = x^2 - 9$, then how many real solutions are there to the equation $f(x) = g(x)$?

- 182 Which expression is equivalent to $(2x - i)^2 - (2x - i)(2x + 3i)$ where i is the imaginary unit and x is a real number?

- 183 If $A = -3 + 5i$, $B = 4 - 2i$, and $C = 1 + 6i$, where i is the imaginary unit, then $A - BC$ equals

- 184 If $(6 - ki)^2 = 27 - 36i$, the value of k is

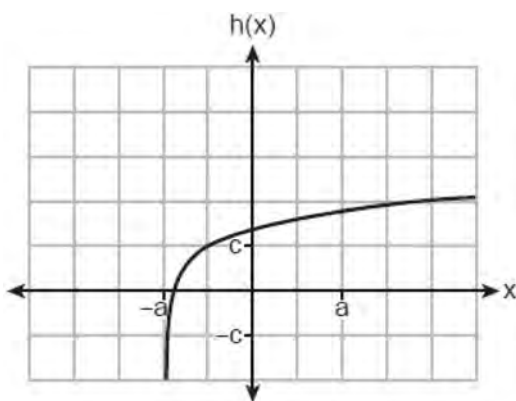
- 185 For $x > 0$, which expression is equivalent to

$$\frac{\sqrt[3]{x^2} \cdot \sqrt{x^5}}{\sqrt[6]{x}}?$$

- 186 For positive values of x , which expression is

equivalent to $\sqrt{16x^2} \cdot x^{\frac{2}{3}} + \sqrt[3]{8x^5}$

- 187 Which equation best represents the graph below?



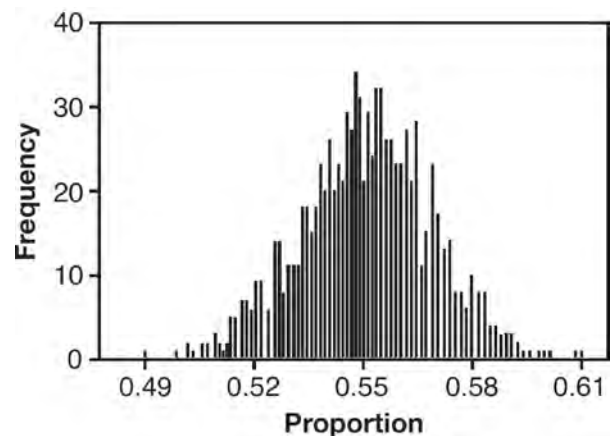
- 188 Evan graphed a cubic function, $f(x) = ax^3 + bx^2 + cx + d$, and determined the roots of $f(x)$ to be ± 1 and 2. What is the value of b , if $a = 1$?

- 189 What is the solution set of $x = \sqrt{3x + 40}$?

- 190 A rush-hour commuter train has arrived on time 64 of its first 80 days. As arrivals continue, which equation can be used to find x , the number of consecutive days that the train must arrive on schedule to raise its on-time performance rate to 90%?

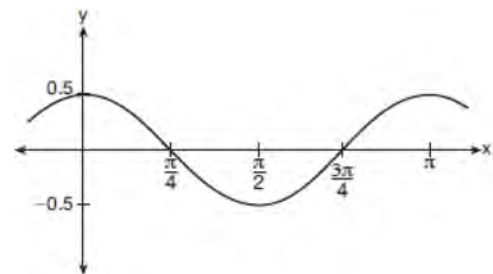
- 191 A 7-year lease for office space states that the annual rent is \$85,000 for the first year and will increase by 6% each additional year of the lease. What will the total rent expense be for the entire 7-year lease?

- 192 A candidate for political office commissioned a poll. His staff received responses from 900 likely voters and 55% of them said they would vote for the candidate. The staff then conducted a simulation of 1000 more polls of 900 voters, assuming that 55% of voters would vote for their candidate. The output of the simulation is shown in the diagram below.



Given this output, and assuming a 95% confidence level, the margin of error for the poll is closest to

- 193 Which equation is represented by the graph shown below?



Algebra II Regents Bimodal Worksheets

- 194 The set of data in the table below shows the results of a survey on the number of messages that people of different ages text on their cell phones each month.

Text Messages per Month			
Age Group	0-10	11-50	Over 50
15-18	4	37	68
19-22	6	25	87
23-60	25	47	157

If a person from this survey is selected at random, what is the probability that the person texts over 50 messages per month given that the person is between the ages of 23 and 60?

- 195 Robert is buying a car that costs \$22,000. After a down payment of \$4000, he borrows the remainder from a bank, a six year loan at 6.24% annual interest rate. The following formula can be used to calculate his monthly loan payment.

$$R = \frac{(P)(i)}{1 - (1 + i)^{-t}}$$

R = monthly payment

P = loan amount

i = monthly interest rate

t = time, in months

Robert's monthly payment will be

- 196 The focal length, F , of a camera's lens is related to the distance of the object from the lens, J , and the distance to the image area in the camera, W , by the formula below.

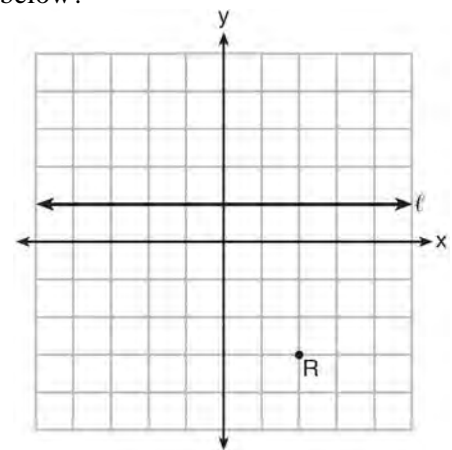
$$\frac{1}{J} + \frac{1}{W} = \frac{1}{F}$$

When this equation is solved for J in terms of F and W , J equals

- 197 Given $y = -2x$ and $x^2 + y^2 = 5$, the point of intersection in Quadrant II is

- 198 Which diagram shows an angle rotation of 1 radian on the unit circle?

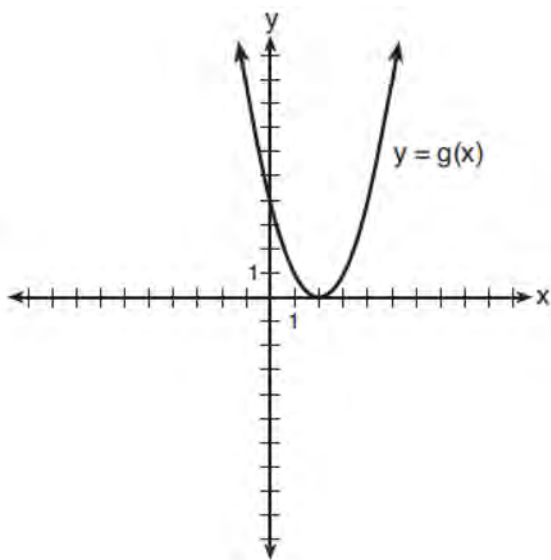
- 199 Which equation represents the set of points equidistant from line ℓ and point R shown on the graph below?



- 200 Which expression is equivalent to $\frac{4x^3 + 9x - 5}{2x - 1}$, where $x \neq \frac{1}{2}$?
- 201 A study of the annual population of the red-winged blackbird in Ft. Mill, South Carolina, shows the population, $B(t)$, can be represented by the function $B(t) = 750(1.16)^t$, where the t represents the number of years since the study began. In terms of the monthly rate of growth, the population of red-winged blackbirds can be best approximated by the function
- 202 Given that $\sin^2 \theta + \cos^2 \theta = 1$ and $\sin \theta = -\frac{\sqrt{2}}{5}$, what is a possible value of $\cos \theta$?
- 203 The equations $y = 3t + 6$ and $y = (1.82)^t$ approximately model the growth of two separate populations where $t > 0$. What is the best approximation of the time, t , at which the populations are the same?
- 204 Last year, the total revenue for Home Style, a national restaurant chain, increased 5.25% over the previous year. If this trend were to continue, which expression could the company's chief financial officer use to approximate their monthly percent increase in revenue? [Let m represent months.]
- 205 A solution of the equation $2x^2 + 3x + 2 = 0$ is
- 206 A parabola has its focus at $(1,2)$ and its directrix is $y = -2$. The equation of this parabola could be
- 207 The voltage used by most households can be modeled by a sine function. The maximum voltage is 120 volts, and there are 60 cycles *every second*. Which equation best represents the value of the voltage as it flows through the electric wires, where t is time in seconds?
- 208 The sequence $a_1 = 6$, $a_n = 3a_{n-1}$ can also be written as
- 209 The probability that Gary and Jane have a child with blue eyes is 0.25, and the probability that they have a child with blond hair is 0.5. The probability that they have a child with both blue eyes and blond hair is 0.125. Given this information, the events blue eyes and blond hair are
 I: dependent
 II: independent
 III: mutually exclusive
- 210 The expression $\frac{4x^3 + 5x + 10}{2x + 3}$ is equivalent to
- 211 For $x \neq 0$, which expressions are equivalent to one divided by the sixth root of x ?
 I. $\frac{\sqrt[6]{x}}{\sqrt[3]{x}}$ II. $\frac{x^{\frac{1}{6}}}{x^{\frac{1}{3}}}$ III. $x^{-\frac{1}{6}}$
- 212 The solutions to the equation $-\frac{1}{2}x^2 = -6x + 20$ are
- 213 A recursive formula for the sequence 18, 9, 4.5, ... is

214 The completely factored form of $2d^4 + 6d^3 - 18d^2 - 54d$ is

215 What is the solution to the system of equations $y = 3x - 2$ and $y = g(x)$ where $g(x)$ is defined by the function below?



216 According to a pricing website, Indroid phones lose 58% of their cash value over 1.5 years. Which expression can be used to estimate the value of a \$300 Indroid phone in 1.5 years?

217 A rabbit population doubles every 4 weeks. There are currently five rabbits in a restricted area. If t represents the time, in weeks, and $P(t)$ is the population of rabbits with respect to time, about how many rabbits will there be in 98 days?

218 Given $f^{-1}(x) = -\frac{3}{4}x + 2$, which equation represents $f(x)$?

219 The expression $\frac{6x^3 + 17x^2 + 10x + 2}{2x + 3}$ equals

220 What is the solution to $8(2^{x+3}) = 48$?

221 If $p(x) = ab^x$ and $r(x) = cd^x$, then $p(x) \cdot r(x)$ equals

222 The Ferris wheel at the landmark Navy Pier in Chicago takes 7 minutes to make one full rotation. The height, H , in feet, above the ground of one of the six-person cars can be modeled by

$$H(t) = 70 \sin\left(\frac{2\pi}{7}(t - 1.75)\right) + 80, \text{ where } t \text{ is time,}$$

in minutes. Using $H(t)$ for one full rotation, this car's minimum height, in feet, is

223 Which equation represents a parabola with the focus at $(0, -1)$ and the directrix of $y = 1$?

224 If the terminal side of angle θ , in standard position, passes through point $(-4, 3)$, what is the numerical value of $\sin \theta$?

225 A company wishes to determine the cooking time for one pound of spaghetti. The company's technicians cooked one pound of spaghetti and recorded the time needed for the spaghetti to be ready to eat. Repeating this process 35 times resulted in an approximately normal distribution, with a mean of 9.82 minutes and a standard deviation of 1.4 minutes. In which interval should the middle 95% of cooking times fall?

- 226 The loudness of sound is measured in units called decibels (dB). These units are measured by first assigning an intensity I_0 to a very soft sound that is called the threshold sound. The sound to be measured is assigned an intensity, I , and the decibel rating, d , of this sound is found using $d = 10 \log \frac{I}{I_0}$. The threshold sound audible to the average person is 1.0×10^{-12} W/m² (watts per square meter). Consider the following sound level classifications:

Moderate	45-69 dB
Loud	70-89 dB
Very loud	90-109 dB
Deafening	>110 dB

How would a sound with intensity 6.3×10^{-3} W/m² be classified?

- 227 Given $f(x) = 2x^2 + 7x - 15$ and $g(x) = 3 - 2x$, what is $\frac{f(x)}{g(x)}$ for all defined values?
- 228 The solution set for the equation $\sqrt{x+14} - \sqrt{2x+5} = 1$ is
- 229 In 2010, the population of New York State was approximately 19,378,000 with an annual growth rate of 1.5%. Assuming the growth rate is maintained for a large number of years, which equation can be used to predict the population of New York State t years after 2010?
- 230 A payday loan company makes loans between \$100 and \$1000 available to customers. Every 14 days, customers are charged 30% interest with compounding. In 2013, Remi took out a \$300 payday loan. Which expression can be used to calculate the amount she would owe, in dollars, after one year if she did not make payments?
- 231 Julie averaged 85 on the first three tests of the semester in her mathematics class. If she scores 93 on each of the remaining tests, her average will be 90. Which equation could be used to determine how many tests, T , are left in the semester?
- 232 The equation of the parabola that has its focus at the point $(-3, 2)$ and directrix at $y = 0$ is
- 233 The Rickerts decided to set up an account for their daughter to pay for her college education. The day their daughter was born, they deposited \$1000 in an account that pays 1.8% compounded annually. Beginning with her first birthday, they deposit an additional \$750 into the account on each of her birthdays. Which expression correctly represents the amount of money in the account n years after their daughter was born?
- 234 Which graph represents a cosine function with no horizontal shift, an amplitude of 2, and a period of $\frac{2\pi}{3}$?

235 If $\sin^2(32^\circ) + \cos^2(M) = 1$, then M equals

236 What is the solution, if any, of the equation

$$\frac{2}{x+3} - \frac{3}{4-x} = \frac{2x-2}{x^2-x-12}?$$

237 Which graph best represents the graph of $f(x) = (x+a)^2(x-b)$, where a and b are positive real numbers?

238 The expression $\frac{x^3 + 2x^2 + x + 6}{x + 2}$ is equivalent to

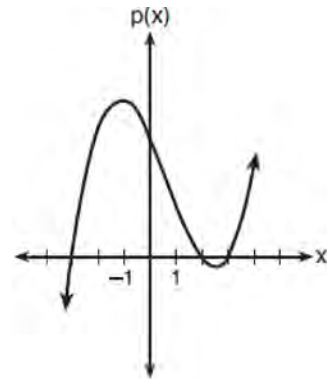
239 The expression $6xi^3(-4xi + 5)$ is equivalent to

240 Which equation represents a parabola with a focus of $(0,4)$ and a directrix of $y = 2$?

241 In 2013, approximately 1.6 million students took the Critical Reading portion of the SAT exam. The mean score, the modal score, and the standard deviation were calculated to be 496, 430, and 115, respectively. Which interval reflects 95% of the Critical Reading scores?

242 A manufacturing company has developed a cost model, $C(x) = 0.15x^3 + 0.01x^2 + 2x + 120$, where x is the number of items sold, in thousands. The sales price can be modeled by $S(x) = 30 - 0.01x$. Therefore, revenue is modeled by $R(x) = x \cdot S(x)$. The company's profit, $P(x) = R(x) - C(x)$, could be modeled by

243 The graph of the function $p(x)$ is sketched below.



Which equation could represent $p(x)$?

244 Given 3 is a root of $f(x) = x^4 - x^3 - 21x^2 + 45x$, what are the other unique roots of $f(x)$?

245 A ball is dropped from a height of 32 feet. It bounces and rebounds 80% of the height from which it was falling. What is the total downward distance, in feet, the ball traveled up to the 12th bounce?

246 Given i is the imaginary unit, $(2 - yi)^2$ in simplest form is

247 Pedro and Bobby each own an ant farm. Pedro starts with 100 ants and says his farm is growing exponentially at a rate of 15% per month. Bobby starts with 350 ants and says his farm is steadily decreasing by 5 ants per month. Assuming both boys are accurate in describing the population of their ant farms, after how many months will they both have approximately the same number of ants?

248 The inverse of the function $f(x) = \frac{x+1}{x-2}$ is

249 Which graph has the following characteristics?

- three real zeros
- as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$
- as $x \rightarrow \infty$, $f(x) \rightarrow \infty$

250 Iridium-192 is an isotope of iridium and has a half-life of 73.83 days. If a laboratory experiment begins with 100 grams of Iridium-192, the number of grams, A , of Iridium-192 present after t days

would be $A = 100\left(\frac{1}{2}\right)^{\frac{t}{73.83}}$. Which equation

approximates the amount of Iridium-192 present after t days?

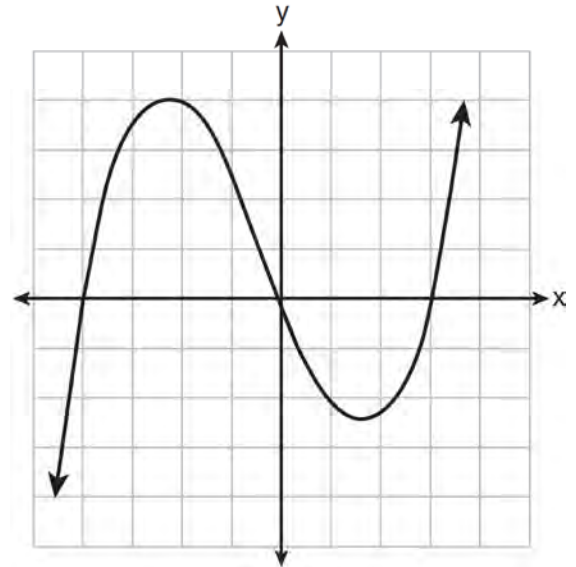
251 The rational expression $\frac{2x^4 - 5x^2 + 3x - 2}{x - 3}$ is equivalent to

252 The solution set for the equation $\sqrt{56-x} = x$ is

253 The value of a new car depreciates over time. Greg purchased a new car in June 2011. The value, V , of his car after t years can be modeled by the equation $\log_{0.8}\left(\frac{V}{17000}\right) = t$. What is the average decreasing rate of change per year of the value of the car from June 2012 to June 2014, to the *nearest ten dollars per year*?

254 The seventh term of the geometric sequence $\sqrt{6}, -2\sqrt{3}, 2\sqrt{6}, -4\sqrt{3}, \dots$ is

255 The graph of $p(x)$ is shown below.



What is the remainder when $p(x)$ is divided by $x + 4$?

256 The solution to the equation $4x^2 + 98 = 0$ is

257 A polynomial equation of degree three, $p(x)$, is used to model the volume of a rectangular box. The graph of $p(x)$ has x intercepts at -2 , 10 , and 14 . Which statements regarding $p(x)$ could be true?

- A. The equation of $p(x) = (x - 2)(x + 10)(x + 14)$.
- B. The equation of $p(x) = -(x + 2)(x - 10)(x - 14)$.
- C. The maximum volume occurs when $x = 10$.
- D. The maximum volume of the box is approximately 56.

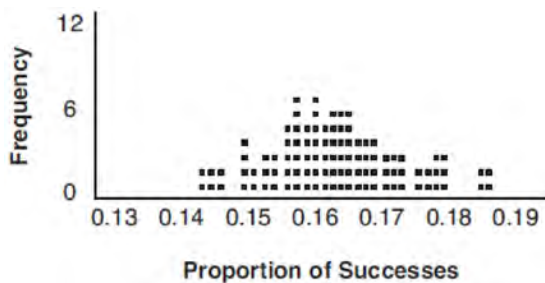
258 The function $f(x) = 2^{-0.25x} \cdot \sin\left(\frac{\pi}{2}x\right)$ represents a damped sound wave function. What is the average rate of change for this function on the interval $[-7, 7]$, to the *nearest hundredth*?

- 259 The function $f(x) = \frac{x-3}{x^2+2x-8}$ is undefined when x equals
- 260 The average cost of a gallon of milk in the United States between the years of 1995 and 2018 can be modeled by the equation $P(t) = -0.0004t^3 + 0.0114t^2 - 0.0150t + 2.6602$, where $P(t)$ represents the cost, in dollars, and t is time in years since January 1995. During this time period, in what year did $P(t)$ reach its maximum?
- 261 What is the inverse of the function $y = \log_3 x$?
- 262 Which expression is equivalent to $(3k - 2i)^2$, where i is the imaginary unit?
- 263 What is the completely factored form of $k^4 - 4k^2 + 8k^3 - 32k + 12k^2 - 48$?
- 264 Given $f(9) = -2$, which function can be used to generate the sequence $-8, -7.25, -6.5, -5.75, \dots$?
- 265 Given $p \neq q$, $p = \left(\frac{1}{2}\right)^q$, expressed in logarithmic form, is equivalent to
- 266 Given $\tan \theta = -\frac{4}{3}$ where $\frac{\pi}{2} < \theta < \pi$, what is the value of $\sec \theta$?
- 267 To the *nearest tenth*, the value of x that satisfies $2^x = -2x + 11$ is
- 268 Relative to the graph of $y = 3 \sin x$, what is the shift of the graph of $y = 3 \sin\left(x + \frac{\pi}{3}\right)$?
- 269 The roots of the equation $x^2 + 2x + 5 = 0$ are
- 270 When $g(x) = \frac{2}{x+2}$ and $h(x) = \log(x+1) + 3$ are graphed on the same set of axes, which coordinates best approximate their point of intersection?
- 271 Mr. Farison gave his class the three mathematical rules shown below to either prove or disprove. Which rules can be proved for all real numbers?
- I $(m+p)^2 = m^2 + 2mp + p^2$
- II $(x+y)^3 = x^3 + 3xy + y^3$
- III $(a^2 + b^2)^2 = (a^2 - b^2)^2 + (2ab)^2$
- 272 Given $f(x) = x^3 - 3$ and $f^{-1}(x) = \sqrt[3]{x - 3b}$, the value of b is
- 273 If a , b , and c are all positive real numbers, which graph could represent the sketch of the graph of $p(x) = -a(x+b)(x^2 - 2cx + c^2)$?
- 274 When factored completely, $m^5 + m^3 - 6m$ is equivalent to

- 275 The heights of women in the United States are normally distributed with a mean of 64 inches and a standard deviation of 2.75 inches. The percent of women whose heights are between 64 and 69.5 inches, to the *nearest whole percent*, is
- 276 A study of the red tailed hawk population in a given area shows the population, $H(t)$, can be represented by the function $H(t) = 50(1.19)^t$ where t represents the number of years since the study began. In terms of the monthly rate of growth, the population can be best approximated by the function
- 277 Given the parent function $p(x) = \cos x$, which phrase best describes the transformation used to obtain the graph of $g(x) = \cos(x + a) - b$, if a and b are positive constants?
- 278 The lifespan of a 60-watt lightbulb produced by a company is normally distributed with a mean of 1450 hours and a standard deviation of 8.5 hours. If a 60-watt lightbulb produced by this company is selected at random, what is the probability that its lifespan will be between 1440 and 1465 hours?
- 279 Mallory wants to buy a new window air conditioning unit. The cost for the unit is \$329.99. If she plans to run the unit three months out of the year for an annual operating cost of \$108.78, which function models the cost per year over the lifetime of the unit, $C(n)$, in terms of the number of years, n , that she owns the air conditioner.
- 280 The roots of the equation $0 = x^2 + 6x + 10$ in simplest $a + bi$ form are
- 281 The function $p(t) = 110e^{0.03922t}$ models the population of a city, in millions, t years after 2010. As of today, consider the following two statements:
I. The current population is 110 million.
II. The population increases continuously by approximately 3.9% per year.
This model supports
- 282 Which equation has $1 - i$ as a solution?
- 283 A circle centered at the origin has a radius of 10 units. The terminal side of an angle, θ , intercepts the circle in Quadrant II at point C . The y -coordinate of point C is 8. What is the value of $\cos \theta$?
- 284 The distribution of the diameters of ball bearings made under a given manufacturing process is normally distributed with a mean of 4 cm and a standard deviation of 0.2 cm. What proportion of the ball bearings will have a diameter less than 3.7 cm?
- 285 The temperature, F , in degrees Fahrenheit, after t hours of a roast put into an oven is given by the equation $F = 325 - 185e^{-0.4t}$. What was the temperature of the roast when it was put into the oven?
- 286 The solution to the equation $18x^2 - 24x + 87 = 0$ is
- 287 Which diagram represents an angle, α , measuring $\frac{13\pi}{20}$ radians drawn in standard position, and its reference angle, θ ?

288 A student studying public policy created a model for the population of Detroit, where the population decreased 25% over a decade. He used the model $P = 714(0.75)^d$, where P is the population, in thousands, d decades after 2010. Another student, Suzanne, wants to use a model that would predict the population after y years. Suzanne's model is best represented by

289 A study conducted in 2004 in New York City found that 212 out of 1334 participants had hypertension. Kim ran a simulation of 100 studies based on these data. The output of the simulation is shown in the diagram below.



At a 95% confidence level, the proportion of New York City residents with hypertension and the margin of error are closest to

290 What is the solution set of the equation

$$\frac{3x + 25}{x + 7} - 5 = \frac{3}{x}?$$

291 The zeros for $f(x) = x^4 - 4x^3 - 9x^2 + 36x$ are

292 The population of Jamesburg for the years 2010-2013, respectively, was reported as follows:
250,000 250,937 251,878 252,822
How can this sequence be recursively modeled?

293 What are the zeros of $P(m) = (m^2 - 4)(m^2 + 1)$?

Algebra II Regents Bimodal Worksheets Answer Section

1 ANS:

$$m_1 = 2000$$

$$m_n = (0.84)m_{n-1}$$

PTS: 2 REF: 081909aai TOP: Sequences

2 ANS:

$$a_1 = 25,000, a_n = a_{n-1} + 1000$$

PTS: 2 REF: 011824aai TOP: Sequences

3 ANS:

1,743,392,200

$$S_{20} = \frac{-2 - (-2)(-3)^{20}}{1 - (-3)} = 1,743,392,200$$

PTS: 2 REF: 012306aai TOP: Series KEY: geometric

4 ANS:

2%

$$9110 = 5000e^{30r}$$

$$\ln \frac{911}{500} = \ln e^{30r}$$

$$\frac{\ln \frac{911}{500}}{30} = r$$

$$r \approx .02$$

PTS: 2 REF: 011810aai TOP: Exponential Growth

5 ANS:

(3,0)

$$\log_2(x-1) - 1 = 0$$

$$\log_2(x-1) = 1$$

$$x-1 = 2^1$$

$$x = 3$$

PTS: 2 REF: 061819aai TOP: Graphing Logarithmic Functions

6 ANS:

(2,-1)

The vertical distance from the directrix to the vertex, p , is 2. The vertical distance from the vertex to the focus must also be 2.

PTS: 2 REF: 062213aai TOP: Graphing Quadratic Functions

7 ANS:

 $\{6\}$

$$\sqrt{3x+18} = x \quad -3 \text{ is extraneous.}$$

$$3x+18 = x^2$$

$$x^2 - 3x - 18 = 0$$

$$(x-6)(x+3) = 0$$

$$x = 6, -3$$

PTS: 2

REF: 082315aai

TOP: Solving Radicals

KEY: extraneous solutions

8 ANS:

$$A(t) = A_0(0.000178)^t$$

$$0.5^{\frac{1}{0.0803}} \approx 0.000178$$

PTS: 2

REF: 082224aai

TOP: Modeling Exponential Functions

9 ANS:

$$y = 2000(1.0032737)^{12t}$$

$$1.04^{\frac{1}{12}} \approx 1.0032737$$

PTS: 2

REF: 011906aai

TOP: Modeling Exponential Functions

10 ANS:

 $\{-1\}$

$$\frac{4}{k^2 - 8k + 12} = \frac{k(k-6) + (k-2)}{k^2 - 8k + 12} \quad k = 6 \text{ is extraneous}$$

$$4 = k^2 - 6k + k - 2$$

$$0 = k^2 - 5k - 6$$

$$0 = (k-6)(k+1)$$

$$k = 6, -1$$

PTS: 2

REF: 082218aai

TOP: Solving Rationals

11 ANS:

$$29,400 \left(1.068^{\frac{1}{365}} \right)^{365t}$$

$$1 \text{ year} = 365 \text{ days}$$

PTS: 2

REF: 061823aai

TOP: Modeling Exponential Functions

12 ANS:

$$P = 12,150(0.679)^d$$

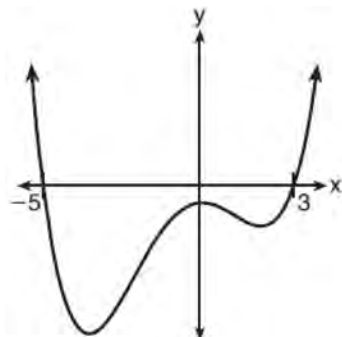
$$.962^{10} \approx .679$$

PTS: 2

REF: 082311aii

TOP: Modeling Exponential Functions

13 ANS:



PTS: 2

REF: 061816aii

TOP: Graphing Polynomial Functions

KEY: bimodalgraph

14 ANS:

$$G(x) - C$$

PTS: 2

REF: 081817aii

TOP: Transformations with Functions

15 ANS:

$$f^{-1}(x) = \log_a x$$

PTS: 2

REF: 011917aii

TOP: Inverse of Functions

KEY: exponential

16 ANS:

$$1 + \frac{2}{x^2 + 4}$$

$$\frac{x^2 + 6}{x^2 + 4} = \frac{x^2 + 4}{x^2 + 4} + \frac{2}{x^2 + 4} = 1 + \frac{2}{x^2 + 4}$$

PTS: 2

REF: 082321aii

TOP: Addition and Subtraction of Rationals

17 ANS:

$$x^2 - 2x + 5 - \frac{27}{2x+4}$$

$$2x+4 \overline{) \begin{array}{r} x^2 - 2x + 5 \\ 2x^3 + 0x^2 + 2x - 7 \\ \underline{2x^3 + 4x^2} \\ -4x^2 + 2x \\ \underline{-4x^2 - 8x} \\ 10x - 7 \\ \underline{10x + 20} \\ -27 \end{array}}$$

PTS: 2 REF: 062313aii TOP: Rational Expressions

KEY: division

18 ANS:

$$f(t) = 10,000(1.00075)^{12t} + 10,000e^{0.008t}$$

$$1 + \frac{.009}{12} = 1.00075$$

PTS: 2 REF: 011918aii TOP: Modeling Exponential Functions

19 ANS:

(3, -1, 0)

$$2x + 4y - 2z = 2 \quad -x - 3y + 2z = 0 \quad x + y = 2 \quad 3 + 2y - z = 1 \quad 2y - z = -2$$

$$\underline{-x - 3y + 2z = 0} \quad \underline{4x - 8y + 2z = 20} \quad \underline{x - y = 4} \quad 6 - 4y + z = 10 \quad \underline{2(-1) - z = -2}$$

$$x + y = 2 \quad 5x - 5y = 20 \quad 2x = 6 \quad 2y - z = -2 \quad z = 0$$

$$x - y = 4 \quad x = 3 \quad \underline{-4y + z = 4}$$

$$-2y = 2$$

$$y = -1$$

PTS: 2 REF: 062208aii TOP: Solving Linear Systems

KEY: three variables

20 ANS:

2

PTS: 2 REF: 062219aii TOP: Unit Circle

21 ANS:

7

$$1240(1.06)^x = 890(1.11)^x$$

$$x \approx 7$$

PTS: 2 REF: 061814aai TOP: Other Systems

22 ANS:

$$C = 550(1.00643)^{12t}$$

$$1.00643^{12} \approx 1.08$$

PTS: 2 REF: 081808aai TOP: Modeling Exponential Functions

23 ANS:

4

$$3x - (-2x + 14) = 16 \quad 3(6) - 4z = 2$$

$$5x = 30 \quad -4z = -16$$

$$x = 6 \quad z = 4$$

PTS: 2 REF: 011803aai TOP: Solving Linear Systems

KEY: three variables

24 ANS:

{ }

$$x(x-2) \left(\frac{10}{x^2-2x} + \frac{4}{x} = \frac{5}{x-2} \right) \quad 2 \text{ is extraneous.}$$

$$10 + 4(x-2) = 5x$$

$$10 + 4x - 8 = 5x$$

$$2 = x$$

PTS: 2 REF: 081915aai TOP: Solving Rationals

KEY: rational solutions

25 ANS:

2.29 and 3.63

PTS: 2 REF: 011814aai TOP: Other Systems

26 ANS:

$$2x^3 - 4x^2 - x + \frac{14}{x+6}$$

$$2x^3 - 4x^2 - x + \frac{14}{x+6}$$

$$x+6 \overline{) 2x^4 + 8x^3 - 25x^2 - 6x + 14}$$

$$\underline{2x^4 + 12x^3}$$

$$-4x^3 - 25x^2$$

$$\underline{-4x^3 - 24x^2}$$

$$-x^2 - 6x$$

$$\underline{-x^2 - 6x}$$

PTS: 2 REF: 081805aai TOP: Rational Expressions
 KEY: division

27 ANS:

$$5\left(2^{\frac{x}{2}}\right)$$

PTS: 2 REF: 061906aai TOP: Families of Functions

28 ANS:

$$\pm 2i, 2$$

$$m^3 - 2m^2 + 4m - 8 = 0$$

$$m^2(m-2) + 4(m-2) = 0$$

$$(m^2 + 4)(m-2) = 0$$

PTS: 2 REF: 081821aai TOP: Solving Polynomial Equations

29 ANS:

$$\frac{-x}{x(x^2 - 9)} = -x$$

$$\frac{-x}{-(x^2 - 9)}$$

PTS: 2 REF: 012023aai TOP: Rational Expressions
 KEY: factoring

30 ANS:

$$\left\{-1, \frac{3}{2}\right\}$$

$$\frac{2}{x} = \frac{4x}{x+3}$$

$$2x+6=4x^2$$

$$4x^2-2x-6=0$$

$$2(2x^2-x-3)=0$$

$$(2x-3)(x+1)=0$$

$$x = \frac{3}{2}, -1$$

PTS: 2

REF: 061809aai

TOP: Solving Rationals

31 ANS:

1,850,000

$$y = 1.77(1.18)^x \quad y(41) \approx 1,850,950$$

PTS: 2

REF: 062314aai

TOP: Regression KEY: exponential

32 ANS:

10

$$440 \times 2.3\% \approx 10$$

PTS: 2

REF: 011807aai

TOP: Normal Distributions

KEY: predict

33 ANS:

{3}

$$\frac{x+2}{x} + \frac{x}{3} = \frac{2x^2+6}{3x} \quad 0 \text{ is extraneous.}$$

$$\frac{x^2+3x+6}{3x} = \frac{2x^2+6}{3x}$$

$$x^2+3x+6=2x^2+6$$

$$x^2-3x=0$$

$$x(x-3)=0$$

$$x=0,3$$

PTS: 2

REF: 012309aai

TOP: Solving Rationals

34 ANS:

$$f(x) = \frac{3}{2}x - \frac{1}{4}$$

$$x = \frac{2}{3}y + \frac{1}{6}$$

$$6x = 4y + 1$$

$$4y = 6x - 1$$

$$y = \frac{6}{4}x - \frac{1}{4}$$

PTS: 2

REF: 062321aii

TOP: Inverse of Functions

KEY: linear

35 ANS:

$$a_1 = 64$$

$$a_n = 0.75a_{n-1}$$

1) is a correct formula, but not recursive

PTS: 2

REF: 082216aii

TOP: Sequences

36 ANS:

$$(x+2)^2 = -8(y-7)$$

$$\frac{5+9}{2} = 7, \text{ vertex: } (-2, 7); p = 7 - 9 = -2, y = \frac{1}{4(-2)}(x+2)^2 + 7$$

$$y - 7 = \frac{1}{-8}(x+2)^2$$

$$-8(y-7) = (x+2)^2$$

PTS: 2

REF: 061821aii

TOP: Graphing Quadratic Functions

37 ANS:

{8}

$$b^2 = 2b^2 - 64 \quad -8 \text{ is extraneous.}$$

$$-b^2 = -64$$

$$b = \pm 8$$

PTS: 2

REF: 061919aii

TOP: Solving Radicals

KEY: extraneous solutions

38 ANS:

(0,2,0)

$$x + y + z = 2 \quad x - 2y - z = -4 \quad 2x - y = -2 \quad x + 2 + z = 2 \quad x + z = 0 \quad 0 + 2 + z = 2$$

$$\underline{x - 2y - z = -4} \quad \underline{x - 9y + z = -18} \quad \underline{2x - 11y = -22} \quad x - 2(2) - z = -4 \quad \underline{x - z = 0} \quad z = 0$$

$$2x - y = -2 \quad 2x - 11y = -22 \quad 10y = 20 \quad 2x = 0$$

$$y = 2 \quad x = 0$$

PTS: 2 REF: 062311aii TOP: Solving Linear Systems

KEY: three variables

39 ANS:

exponential function

PTS: 2 REF: 081903aii TOP: Families of Functions

40 ANS:

240

$$p(5) = 2(5)^3 - 3(5) + 5 = 240$$

PTS: 2 REF: 011819aii TOP: Remainder and Factor Theorems

41 ANS:

 $\{-6\}$

$$\frac{(x+3)(x+2)}{(x-5)(x+2)} + \frac{6(x-5)}{(x+2)(x-5)} = \frac{6+10x}{(x-5)(x+2)} \quad 5 \text{ is extraneous.}$$

$$x^2 + 5x + 6 + 6x - 30 = 10x + 6$$

$$x^2 + x - 30 = 0$$

$$(x+6)(x-5) = 0$$

$$x = -6, 5$$

PTS: 2 REF: 062319aii TOP: Solving Rationals

42 ANS:

0.05

.43 \pm 2(0.05) contains about 95% of the data.

PTS: 2 REF: 062317aii TOP: Analysis of Data

43 ANS:

 $-\frac{24}{7}$

$$\text{If } \cos \theta = \frac{7}{25}, \sin \theta = \pm \frac{24}{25}, \text{ and } \tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{-\frac{24}{25}}{\frac{7}{25}} = -\frac{24}{7}$$

PTS: 2 REF: 081811aii TOP: Determining Trigonometric Functions

44 ANS:

I and II, only

$$x^3 + 2x^2 - 9x - 18 = 0 \quad x^3 - 9x + 2x^2 - 18 = 0 \quad x^3 - 9x + 2x^2 - 18 = 0$$

$$x^2(x+2) - 9(x+2) = 0 \quad x(x^2 - 9) + 2(x^2 - 9) = 0 \quad x(x^2 - 9) + 2(x^2 - 9) = 0$$

$$(x+2)(x^2 - 9) = 0$$

PTS: 2

REF: 011903aai

TOP: Solving Polynomial Equations

45 ANS:

$$2 \pm 3i$$

$$x^2 - 4x + 4 = -13 + 4$$

$$(x - 2)^2 = -9$$

$$x - 2 = \pm 3i$$

$$x = 2 \pm 3i$$

PTS: 2

REF: 062312aai

TOP: Solving Quadratics

KEY: complex solutions | completing the square

46 ANS:

$$r(x) = (x - a)(x + b)(x + c)^2$$

PTS: 2

REF: 061921aai

TOP: Graphing Polynomial Functions

47 ANS:

$$\frac{124}{x + 16y}$$

PTS: 2

REF: 061824aai

TOP: Modeling Rationals

48 ANS:

$$y = -\frac{1}{8}(x + 3)^2 + 5$$

The vertex is $(-3, 5)$ and $p = 2$. $y = \frac{-1}{4(2)}(x + 3)^2 + 5$

PTS: 2

REF: 011914aai

TOP: Graphing Quadratic Functions

49 ANS:

$$\frac{\ln 1.25}{0.025}$$

$$\frac{15000}{12000} = \frac{12000e^{.025t}}{12000}$$

$$1.25 = e^{.025t}$$

$$\ln 1.25 = \ln e^{.025t}$$

$$\ln 1.25 = .025t$$

$$\frac{\ln 1.25}{.025} = t$$

PTS: 2 REF: 082209aai TOP: Exponential Growth

50 ANS:

$$y = 5$$

In vertex form, the parabola is $y = -\frac{1}{4(2)}(x+4)^2 + 3$. The vertex is $(-4, 3)$ and $p = 2$. $3 + 2 = 5$

PTS: 2 REF: 011816aai TOP: Graphing Quadratic Functions

51 ANS:

34

$$121(b)^2 = 64 \quad 64\left(\frac{8}{11}\right)^2 \approx 34$$

$$b = \frac{8}{11}$$

PTS: 2 REF: 011904aai TOP: Sequences KEY: explicit

52 ANS:

$$y = -\frac{1}{16}(x-2)^2 + 1$$

The distance from the vertex to the focus, p , is 4. Since the focus is below the vertex, p is negative.

$$y = -\frac{1}{4(4)}(x-2)^2 + 1$$

PTS: 2 REF: 082212aai TOP: Graphing Quadratic Functions

53 ANS:

$$f(x) = 35,000(1.0027)^{12x}$$

$$1.0325^{\frac{1}{12}} \approx 1.0027$$

PTS: 2 REF: 012323aai TOP: Modeling Exponential Functions

54 ANS:

18%

$$45\% + 31\% - 58\% = 18\%$$

PTS: 2 REF: 082307aai TOP: Theoretical Probability

55 ANS:
380
 $400 \cdot .954 \approx 380$

PTS: 2 REF: 061918aai TOP: Normal Distributions
KEY: predict

56 ANS:
 $(n+3)(n-3)(n+6)(n-2)$
 $n^2(n^2-9) + 4n(n^2-9) - 12(n^2-9)$
 $(n^2+4n-12)(n^2-9)$
 $(n+6)(n-2)(n+3)(n-3)$

PTS: 2 REF: 061911aai TOP: Factoring Polynomials
KEY: factoring by grouping

57 ANS:
 $g(x)$ and $j(x)$

PTS: 2 REF: 082308aai TOP: Using the Discriminant
KEY: determine nature of roots given equation, graph, table

58 ANS:
-0.087
 $100\left(\frac{1}{2}\right)^{\frac{d}{8}} = 100e^{kd}$
 $\left(\frac{1}{2}\right)^{\frac{1}{8}} = e^k$
 $k \approx -0.087$

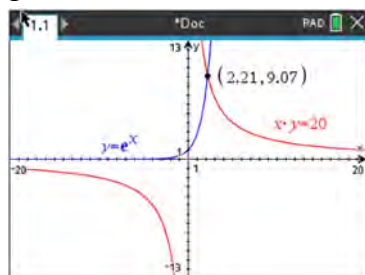
PTS: 2 REF: 061818aai TOP: Exponential Decay

59 ANS:
-3

PTS: 2 REF: 011815aai TOP: Unit Circle

60 ANS:

1



PTS: 2 REF: 082210aai TOP: Other Systems

61 ANS:

$$3x - 1 - \frac{1}{3x + 1}$$

$$3x + 1 \overline{) 9x^2 + 0x - 2}$$

$$\underline{9x^2 + 3x}$$

$$-3x - 2$$

$$\underline{-3x - 1}$$

$$-1$$

PTS: 2 REF: 081910aai TOP: Rational Expressions

KEY: division

62 ANS:

$$-\frac{2}{3}$$

$$\sin^2 A + \left(\frac{\sqrt{5}}{3}\right)^2 = 1 \quad \text{Since } \tan A < 0, \sin A = -\frac{2}{3}$$

$$\sin^2 A + \frac{5}{9} = \frac{9}{9}$$

$$\sin^2 A = \frac{4}{9}$$

$$\sin A = \pm \frac{2}{3}$$

PTS: 2 REF: 012320aai TOP: Determining Trigonometric Functions

63 ANS:

\$17,433,922.00

$$S_{20} = \frac{.01 - .01(3)^{20}}{1 - 3} = 17,433,922$$

PTS: 2

REF: 011822aii

TOP: Series

KEY: geometric

64 ANS:

$$R(n) = 1200(1.002)^n - 100n$$

PTS: 2

REF: 012002aii

TOP: Operations with Functions

65 ANS:

$$2000(1.003)^{12t}$$

$$2000 \left(1 + \frac{.032}{12} \right)^{12t} \approx 2000(1.003)^{12t}$$

PTS: 2

REF: 012004aii

TOP: Modeling Exponential Functions

66 ANS:

$$y = \frac{1}{4}x - \frac{5}{4}$$

$$x = 4y + 5$$

$$x - 5 = 4y$$

$$\frac{1}{4}x - \frac{5}{4} = y$$

PTS: 2

REF: 061909aii

TOP: Inverse of Functions

KEY: linear

67 ANS:

$$400(1.001121184)^{52t}$$

$$1.06^{\frac{1}{52}}$$

PTS: 2

REF: 061924aii

TOP: Modeling Exponential Functions

68 ANS:

$$-\frac{\sqrt{7}}{4}$$

$$-\sqrt{1 - \left(-\frac{3}{4}\right)^2} = -\sqrt{\frac{16}{16} - \frac{9}{16}} = -\sqrt{\frac{7}{16}} = -\frac{\sqrt{7}}{4}$$

PTS: 2

REF: 081905aii

TOP: Determining Trigonometric Functions

69 ANS:

4.8

PTS: 2

REF: 082203aii

TOP: Graphing Trigonometric Functions

KEY: amplitude

70 ANS:

$$1 + \frac{9}{x^2 + 3}$$

$$\frac{x^2 + 12}{x^2 + 3} = \frac{x^2 + 3}{x^2 + 3} + \frac{9}{x^2 + 3} = 1 + \frac{9}{x^2 + 3}$$

PTS: 2 REF: 062218aai TOP: Addition and Subtraction of Rationals

71 ANS:

$$-9x^2 + 12xi + 10$$

$$6 - (3x - 2i)(3x - 2i) = 6 - (9x^2 - 12xi + 4i^2) = 6 - 9x^2 + 12xi + 4 = -9x^2 + 12xi + 10$$

PTS: 2 REF: 061915aai TOP: Operations with Complex Numbers

72 ANS:

10 or -2

$$x - \frac{20}{x} = 8$$

$$x^2 - 8x - 20 = 0$$

$$(x - 10)(x + 2) = 0$$

$$x = 10, -2$$

PTS: 2 REF: 061916aai TOP: Modeling Rationals

73 ANS:

0.25

$$P(B) \cdot P(A|B) = P(A \text{ and } B)$$

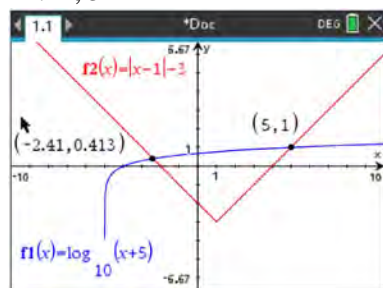
$$P(B) \cdot 0.8 = 0.2$$

$$P(B) = 0.25$$

PTS: 2 REF: 081913aai TOP: Conditional Probability

74 ANS:

-2.41, 5



PTS: 2 REF: 012317aai TOP: Other Systems

75 ANS:

$$\left\{ \frac{1}{2} \right\}$$

$$\frac{2}{3x+1} = \frac{1}{x} - \frac{6x}{3x+1} - \frac{1}{3} \text{ is extraneous.}$$

$$\frac{6x+2}{3x+1} = \frac{1}{x}$$

$$6x^2 + 2x = 3x + 1$$

$$6x^2 - x - 1 = 0$$

$$(2x-1)(3x+1) = 0$$

$$x = \frac{1}{2}, -\frac{1}{3}$$

PTS: 2

REF: 011915aaii

TOP: Solving Rationals

76 ANS:

$$-3x^2 + 18xi$$

$$(x+3i)^2 - (2x-3i)^2 = x^2 + 6xi + 9i^2 - (4x^2 - 12xi + 9i^2) = -3x^2 + 18xi$$

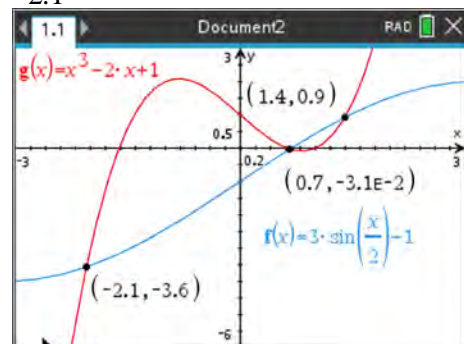
PTS: 2

REF: 061805aaii

TOP: Operations with Complex Numbers

77 ANS:

-2.1



PTS: 2

REF: 012021aaii

TOP: Other Systems

78 ANS:

$$-12x$$

$$x^2 - 6x + 9 - (x^2 + 6x + 9) = -12x$$

PTS: 2

REF: 062210aaii

TOP: Operations with Functions

79 ANS:

$$-\frac{1}{3} \pm \frac{2i\sqrt{5}}{3}$$

$$x = \frac{-2 \pm \sqrt{2^2 - 4(3)(7)}}{2(3)} = \frac{-2 \pm \sqrt{-80}}{6} = \frac{-2 \pm i\sqrt{16}\sqrt{5}}{6} = -\frac{1}{3} \pm \frac{2i\sqrt{5}}{3}$$

PTS: 2 REF: 081809aai TOP: Solving Quadratics

KEY: complex solutions | quadratic formula

80 ANS:

$$f^{-1}(x) = -\frac{1}{6}x + \frac{1}{12}$$

$$y = -6x + \frac{1}{2}$$

$$x = -6y + \frac{1}{2}$$

$$x - \frac{1}{2} = -6y$$

$$-\frac{1}{6}\left(x - \frac{1}{2}\right) = y$$

PTS: 2 REF: 062217aai TOP: Inverse of Functions

KEY: linear

81 ANS:

$$\frac{x+3}{x}$$

$$\frac{x^2(x+2) - 9(x+2)}{x(x^2 - x - 6)} = \frac{(x^2 - 9)(x+2)}{x(x-3)(x+2)} = \frac{(x+3)(x-3)}{x(x-3)} = \frac{x+3}{x}$$

PTS: 2 REF: 061803aai TOP: Rational Expressions

KEY: factoring

82 ANS:

$$(3 - x^2) - (4x + 7)i$$

$$7 - 3i + x^2 - 4xi + 4i^2 - 4i - 2x^2 = 7 - 7i - x^2 - 4xi - 4 = 3 - x^2 - 4xi - 7i = (3 - x^2) - (4x + 7)i$$

PTS: 2 REF: 012022aai TOP: Operations with Complex Numbers

83 ANS:

$$a_0 = 75,000$$

$$a_n = 0.92(a_{n-1})$$

PTS: 2 REF: 081810aai TOP: Sequences

84 ANS:

$$\frac{-c-d}{d+2c}$$

$$\frac{c^2-d^2}{d^2+cd-2c^2} = \frac{(c+d)(c-d)}{(d+2c)(d-c)} = \frac{-(c+d)}{d+2c} = \frac{-c-d}{d+2c}$$

PTS: 2 REF: 011818aai TOP: Rational Expressions

KEY: factoring

85 ANS:

$$-0.18x^3 - 6.02x^2 + 91.4x - 180$$

$$95.4x - 6x^2 - (0.18x^3 + 0.02x^2 + 4x + 180)$$

PTS: 2 REF: 082322aai TOP: Operations with Functions

86 ANS:

18

$$120 = 68 + (195 - 68)e^{-0.05t}$$

$$52 = 127e^{-0.05t}$$

$$\ln \frac{52}{127} = \ln e^{-0.05t}$$

$$\ln \frac{52}{127} = -0.05t$$

$$\frac{\ln \frac{52}{127}}{-0.05} = t$$

$$18 \approx t$$

PTS: 2 REF: 081918aai TOP: Exponential Decay

87 ANS:

Both a and b are positive.

$$a = 105, 0 < b < 1$$

PTS: 2 REF: 082314aai TOP: Modeling Exponential Functions

88 ANS:

$$\frac{1}{2}$$

$$\frac{20}{14+20+6} = \frac{1}{2}$$

PTS: 2 REF: 082303aai TOP: Conditional Probability

89 ANS:

$$(x-4)^2 = -8(y+1)$$

The distance between the focus and directrix is $1 - (-3) = 4$. p is half this distance, or 2. The vertex of the parabola

is $(4, -1)$. Since the directrix is above the focus, the parabola faces downward. $y = -\frac{1}{4p}(x-h)^2 + k$

$$y = -\frac{1}{4(2)}(x-4)^2 - 1$$

$$y+1 = -\frac{1}{8}(x-4)^2$$

PTS: 2

REF: 012322aii

TOP: Graphing Quadratic Functions

90 ANS:

[33,79]

$$-23(1) + 56 = 33; \quad -23(-1) + 56 = 79$$

PTS: 2

REF: 062305aii

TOP: Graphing Trigonometric Functions

91 ANS:

3

$$1^3 - k(1)^2 + 2(1) = 0$$

$$k = 3$$

PTS: 2

REF: 061812aii

TOP: Remainder and Factor Theorems

92 ANS:

 $\{(0,6),(-5,-9)\}$

$$(x+4)^2 - 10 = 3x+6 \quad y = 3(-5) + 6 = -9$$

$$x^2 + 8x + 16 - 10 = 3x + 6 \quad y = 3(0) + 6 = 6$$

$$x^2 + 5x = 0$$

$$x(x+5) = 0$$

$$x = -5, 0$$

PTS: 2

REF: 061903aii

TOP: Quadratic-Linear Systems

93 ANS:

631

$$84.1\% \times 750 \approx 631$$

PTS: 2

REF: 011923aii

TOP: Normal Distributions

KEY: predict

94 ANS:

$$\pm i$$

$$wx^2 + w = 0$$

$$w(x^2 + 1) = 0$$

$$x^2 = -1$$

$$x = \pm i$$

PTS: 2 REF: 061912aai TOP: Solving Quadratics

KEY: complex solutions | taking square roots

95 ANS:

II, only

The mass of the carbon-14 is decreasing by half every 5715 years.

PTS: 2 REF: 062211aai TOP: Modeling Exponential Functions

96 ANS:

45

$$P = \frac{2\pi}{\frac{\pi}{45}} = 90$$

PTS: 2 REF: 081822aai TOP: Graphing Trigonometric Functions

KEY: period

97 ANS:

2,125,760

$$8r^3 = 216 \quad S_{12} = \frac{8 - 8(3)^{12}}{1 - 3} = 2125760$$

$$r^3 = 27$$

$$r = 3$$

PTS: 2 REF: 081902aai TOP: Series KEY: geometric

98 ANS:

0.2743



PTS: 2 REF: 061817aai TOP: Normal Distributions

KEY: probability

99 ANS:

0

$$(x^2 - y^2) + (2xy)^2 = x^2 + 4x^2y^2 - y^2$$

$$(x - y) + (x^2 - xy + y^2) = x^2 + x - y - xy + y^2$$

$$(x - y)(x - y)(x^2 + y^2) = (x^2 - 2xy + y^2)(x^2 + y^2) = x^4 - 2x^3y + x^2y^2 + x^2y^2 - 2xy^3 + y^4$$

PTS: 2

REF: 062322aai

TOP: Polynomial Identities

100 ANS:

\$885.76

$$M = \frac{45000 \left(\frac{6.75\%}{12} \right) \left(1 + \frac{6.75\%}{12} \right)^{5 \times 12}}{\left(1 + \frac{6.75\%}{12} \right)^{5 \times 12} - 1} \approx 885.76$$

PTS: 2

REF: 082316aai

TOP: Evaluating Exponential Expressions

101 ANS:

$$\frac{1}{5} \pm \frac{\sqrt{19}}{5} i$$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(5)(4)}}{2(5)} = \frac{2 \pm \sqrt{-76}}{10} = \frac{2 \pm i\sqrt{4}\sqrt{19}}{10} = \frac{1}{5} \pm \frac{i\sqrt{19}}{5}$$

PTS: 2

REF: 011905aai

TOP: Solving Quadratics

KEY: complex solutions | quadratic formula

102 ANS:

$$2ab\sqrt[3]{a^2}$$

$$\left(a\sqrt[3]{2b^2} \right) \left(\sqrt[3]{4a^2b} \right) = a\sqrt[3]{8a^2b^3} = 2ab\sqrt[3]{a^2}$$

PTS: 2

REF: 082213aai

TOP: Operations with Radicals

KEY: with variables, index > 2

103 ANS:

$$x^2 = 4(y - 5)$$

Since the distance from the focus to the directrix is 2, $p = 1$ and the vertex of the parabola is (0,5).

$$y = \frac{1}{4p}(x - h)^2 + k$$

$$y = \frac{1}{4(1)}(x - 0)^2 + 5$$

$$y = \frac{1}{4}x^2 + 5$$

$$y - 5 = \frac{1}{4}x^2$$

$$4(y - 5) = x^2$$

PTS: 2

REF: 062323aii

TOP: Graphing Quadratic Functions

104 ANS:

$$g(x) = 2x - 16$$

$$y = \frac{1}{2}x + 8 \quad x = \frac{1}{2}y + 8$$

$$2x = y + 16$$

$$y = 2x - 16$$

PTS: 2

REF: 081806aii

TOP: Inverse of Functions

KEY: linear

105 ANS:

0.8

PTS: 2

REF: 081824aii

TOP: Conditional Probability

106 ANS:

14.066

$$\ln e^{0.3x} = \ln \frac{5918}{87}$$

$$x = \frac{\ln \frac{5918}{87}}{0.3}$$

PTS: 2

REF: 081801aii

TOP: Exponential Equations

KEY: without common base

107 ANS:

7

$$50(.9)^t = 25$$

$$t \approx 6.57$$

PTS: 2

REF: 082317aii

TOP: Exponential Decay

108 ANS:

2%



PTS: 2

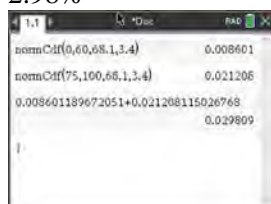
REF: 081919aai

TOP: Normal Distributions

KEY: percent

109 ANS:

2.98%



PTS: 2

REF: 062316aai

TOP: Normal Distributions

KEY: percent

110 ANS:

 $(0.134, 0.374)$ $0.254 \pm 2(0.060) \rightarrow (0.134, 0.374)$

PTS: 2

REF: 061913aai

TOP: Analysis of Data

111 ANS:

 $g(x) = \log_3(x + 5)$

PTS: 2

REF: 011902aai

TOP: Graphing Logarithmic Functions

112 ANS:

$$\frac{3}{2} \pm \frac{\sqrt{17}}{2}$$

$$x - \frac{4}{x-1} = 2 \quad x = \frac{3 \pm \sqrt{(-3)^2 - 4(1)(-2)}}{2(1)} = \frac{3 \pm \sqrt{17}}{2}$$

$$x(x-1) - 4 = 2(x-1)$$

$$x^2 - x - 4 = 2x - 2$$

$$x^2 - 3x - 2 = 0$$

PTS: 2

REF: 011812aai

TOP: Solving Rationals

KEY: rational solutions

113 ANS:

$$\begin{array}{r}
 x^2 + 2x + 4 + \frac{6}{x-2} \\
 \frac{x^2 + 2x + 4}{x-2} \overline{) x^3 - 0x^2 + 0x - 2} \\
 \underline{x^3 - 2x^2} \\
 2x^2 + 0x \\
 \underline{2x^2 - 4x} \\
 4x - 2 \\
 \underline{4x - 8} \\
 6
 \end{array}$$

PTS: 2 REF: 082217aii TOP: Rational Expressions

KEY: division

114 ANS:

$$\frac{3}{2}$$

$$\sqrt{(-2)^2 + (-3)^2} = \sqrt{13}; \tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\frac{-3}{\sqrt{13}}}{\frac{-2}{\sqrt{13}}} = \frac{3}{2}$$

PTS: 2 REF: 062304aii TOP: Determining Trigonometric Functions

KEY: extension to reals

115 ANS:

12%

$$0.48 \cdot 0.25 = 0.12$$

PTS: 1 REF: 061811aii TOP: Probability of Compound Events

KEY: probability

116 ANS:

$$I = I_0(0.0067)^t$$

$$e^{\left(\frac{3}{0.6}\right)} \approx 0.006738$$

PTS: 2 REF: 062315aii TOP: Modeling Exponential Functions

117 ANS:

$$\begin{array}{r}
 x^3 - 2x^2 - x + 6 + \frac{2}{x+2} \\
 \frac{x^3 - 2x^2 - x + 6}{x+2} \overline{) x^4 + 0x^3 - 5x^2 + 4x + 14} \\
 \underline{x^4 + 2x^3} \\
 -2x^3 - 5x^2 \\
 \underline{-2x^3 - 4x^2} \\
 -x^2 + 4x \\
 \underline{-x^2 - 2x} \\
 6x + 14 \\
 \underline{6x + 12} \\
 2
 \end{array}$$

PTS: 2 REF: 012305aia TOP: Rational Expressions

KEY: division

118 ANS:

$$P(t) = 500(1.00247)^{12t}$$

$$\left(1.03^{\frac{1}{12}}\right)^{12t} \approx 1.00247^{12t}$$

PTS: 2 REF: 062224aia TOP: Modeling Exponential Functions

119 ANS:

$$\begin{array}{r}
 5x^2 + x - 3 \\
 \frac{5x^2 + x - 3}{2x-1} \overline{) 10x^3 - 3x^2 - 7x + 3} \\
 \underline{10x^3 - 5x^2} \\
 2x^2 - 7x \\
 \underline{2x^2 - x} \\
 -6x + 3 \\
 \underline{-6x + 3} \\
 0
 \end{array}$$

PTS: 2 REF: 011809aia TOP: Rational Expressions

KEY: division

120 ANS:

$$\frac{-2}{\sqrt{21}}$$

$$\frac{-2}{\sqrt{5^2 - 2^2}} = \frac{-2}{\sqrt{21}}$$

PTS: 2 REF: 082312aai TOP: Determining Trigonometric Functions

121 ANS:

$$P(t) = 3500(1.00206)^{12t}$$

$$1.025^{\frac{1}{12}} \approx 1.00206$$

PTS: 2 REF: 081924aai TOP: Modeling Exponential Functions

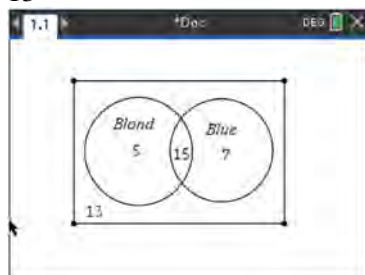
122 ANS:

$$y = -h(x)$$

PTS: 2 REF: 062205aai TOP: Transformations with Functions

123 ANS:

13



$$40 - (20 + 22 - 15) = 13$$

PTS: 2 REF: 062204aai TOP: Venn Diagrams

124 ANS:

$$(x+5)(x+3)$$

$$u = x+2 \quad u^2 + 4u + 3$$

$$(u+3)(u+1)$$

$$(x+2+3)(x+2+1)$$

$$(x+5)(x+3)$$

PTS: 2 REF: 081901aai TOP: Factoring Polynomials

KEY: higher power

125 ANS:

150°

PTS: 2 REF: 082205aai TOP: Unit Circle

126 ANS:

I

$$\frac{-12}{16} = \frac{9}{-12} = \frac{-6.75}{9}$$

PTS: 2 REF: 012017aai TOP: Sequences KEY: difference or ratio

127 ANS:

$$\frac{x}{x+2}$$

$$\frac{x^2 + 3x}{x^2 + 5x + 6} = \frac{x(x+3)}{(x+2)(x+3)}$$

PTS: 2 REF: 082215aai TOP: Rational Expressions

KEY: factoring

128 ANS:

[1, 10]

$$\frac{N(10) - N(1)}{10 - 1} \approx -2.03, \frac{N(20) - N(10)}{20 - 10} \approx -1.63, \frac{N(25) - N(15)}{25 - 15} \approx -1.46, \frac{N(30) - N(1)}{30 - 1} \approx -1.64$$

PTS: 2 REF: 061807aai TOP: Rate of Change

129 ANS:

10.25

The maximum of p is 5. The minimum of f is $-\frac{21}{4}$ ($x = \frac{-6}{2(4)} = -\frac{3}{4}$)

$$f\left(-\frac{3}{4}\right) = 4\left(-\frac{3}{4}\right)^2 + 6\left(-\frac{3}{4}\right) - 3 = 4\left(\frac{9}{16}\right) - \frac{18}{4} - \frac{12}{4} = -\frac{21}{4}. \frac{20}{4} - \left(-\frac{21}{4}\right) = \frac{41}{4} = 10.25$$

PTS: 2 REF: 011922aai TOP: Comparing Functions

130 ANS:

neither I nor II

$$(x-y)^2 = x^2 - 2xy + y^2 \quad (x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

PTS: 2 REF: 061902aai TOP: Polynomial Identities

131 ANS:

$$-3a + 18i$$

$$3i(ai - 6i^2) = 3ai^2 - 18i^3 = -3a + 18i$$

PTS: 2 REF: 062307aai TOP: Operations with Complex Numbers

132 ANS:

77

$$T(19) = 8 \sin(0.3(19) - 3) + 74 \approx 77$$

PTS: 2 REF: 061922aai TOP: Graphing Trigonometric Functions

133 ANS:

I, II, and III

$$\frac{x^2 - 4x}{2x} = \frac{x(x-4)}{2x} = \frac{x-4}{2} = \frac{x}{2} - 2 = \frac{x-1}{2} - \frac{3}{2} = \frac{x-1-3}{2} = \frac{x-4}{2}$$

PTS: 2 REF: 011921aii TOP: Rational Expressions

KEY: factoring

134 ANS:

 $\{-1, 0\}$

$$\sqrt{x+1} = x+1$$

$$x+1 = x^2 + 2x + 1$$

$$0 = x^2 + x$$

$$0 = x(x+1)$$

$$x = -1, 0$$

PTS: 2 REF: 011802aii TOP: Solving Radicals

KEY: extraneous solutions

135 ANS:

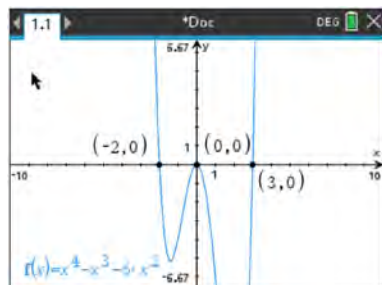
$$\frac{\sqrt{6}}{5}$$

$$5x^2 - 4x + 2 = 0 \quad \frac{4 \pm \sqrt{(-4)^2 - 4(5)(2)}}{2(5)} = \frac{4 \pm \sqrt{-24}}{10} = \frac{4 \pm 2i\sqrt{6}}{10} = \frac{2 \pm i\sqrt{6}}{5}$$

PTS: 2 REF: 012020aii TOP: Solving Quadratics

KEY: complex solutions | quadratic formula

136 ANS:

 $x < -2$ or $x > 3$ 

PTS: 2 REF: 012316aii TOP: Graphing Polynomial Functions

137 ANS:

(2,5)

The vertex is (2,2) and $p = 3$. $3 + 2 = 5$

PTS: 2 REF: 081823aii TOP: Graphing Quadratic Functions

138 ANS:
1660

PTS: 2 REF: 062214aai TOP: Normal Distributions
KEY: predict

139 ANS:

$$\frac{13}{24}$$

$$\frac{13}{13+11} = \frac{13}{24}$$

PTS: 2 REF: 012011aai TOP: Conditional Probability

140 ANS:
8.52

PTS: 2 REF: 061914aai TOP: Other Systems

141 ANS:
2.5

$$4300e^{0.07x} = 5123$$

$$\ln e^{0.07x} = \ln \frac{5123}{4300}$$

$$0.07x = \ln \frac{5123}{4300}$$

$$x = \frac{\ln \frac{5123}{4300}}{0.07}$$

$$x \approx 2.5$$

PTS: 2 REF: 012302aai TOP: Exponential Equations

KEY: without common base

142 ANS:

$$2x^2 + x - 6 - \frac{7}{x+3}$$

$$x+3 \overline{) \begin{array}{r} 2x^2 + x - 6 \\ 2x^3 + 7x^2 - 3x - 25 \\ \underline{2x^3 + 6x^2} \\ x^2 - 3x \\ \underline{x^2 + 3x} \\ -6x - 25 \\ \underline{-6x - 18} \\ -7 \end{array}}$$

PTS: 2 REF: 062203aii TOP: Rational Expressions

KEY: division

143 ANS:

$$\frac{-8.93}{6-0} \approx -8.93$$

PTS: 2 REF: 012012aii TOP: Rate of Change

144 ANS:

$$\ln\left(\frac{c}{a}\right)$$

$$e^{bt} = \frac{c}{a}$$

$$\ln e^{bt} = \ln \frac{c}{a}$$

$$bt \ln e = \ln \frac{c}{a}$$

$$t = \frac{\ln \frac{c}{a}}{b}$$

PTS: 2 REF: 011813aii TOP: Exponential Equations

KEY: without common base

145 ANS:

4.78

PTS: 2 REF: 082313aii TOP: Normal Distributions

KEY: percent

146 ANS:

$$f^{-1}(x) = \frac{-2x}{x-1}$$

$$x = \frac{y}{y+2}$$

$$xy + 2x = y$$

$$xy - y = -2x$$

$$y(x-1) = -2x$$

$$y = \frac{-2x}{x-1}$$

PTS: 2

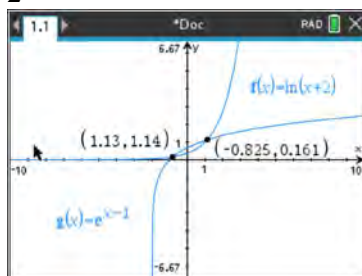
REF: 081924aai

TOP: Inverse of Functions

KEY: rational

147 ANS:

2



PTS: 2

REF: 081920aai

TOP: Other Systems

148 ANS:

$$f^{-1}(x) = 2 - \frac{x}{6}$$

$$x = -6(y-2)$$

$$-\frac{x}{6} = y - 2$$

$$-\frac{x}{6} + 2 = y$$

PTS: 2

REF: 011821aai

TOP: Inverse of Functions

KEY: linear

149 ANS:

0.271

$$y = 278(0.5)^{\frac{18}{1.8}} \approx 0.271$$

PTS: 2

REF: 011920aai

TOP: Modeling Exponential Functions

150 ANS:
10.4

PTS: 2 REF: 011804aai TOP: Graphing Trigonometric Functions

151 ANS:
 $x + 2$

PTS: 2 REF: 082324aai TOP: Graphing Polynomial Functions

152 ANS:
 $x(x - 1)$

$$u = x + 2 \quad u^2 - 5u + 6$$

$$(u - 3)(u - 2)$$

$$(x + 2 - 3)(x + 2 - 2)$$

$$(x - 1)x$$

PTS: 2 REF: 012301aai TOP: Factoring Polynomials

KEY: higher power

153 ANS:

$$a = 2, b = 6, c = 3$$

The cosine function has been translated +3. Since the maximum is 5 and the minimum is 1, the amplitude is 2.

$$\frac{\pi}{3} = \frac{2\pi}{b}$$

$$b = 6$$

PTS: 2 REF: 011913aai TOP: Modeling Trigonometric Functions

154 ANS:

$$f^{-1}(x) = \frac{x + 4}{12}$$

$$x = 12y - 4$$

$$x + 4 = 12y$$

$$\frac{x + 4}{12} = y$$

PTS: 2 REF: 082304aai TOP: Inverse of Functions

KEY: linear

155 ANS:

(1,2) and (-1,-2)

$$x^2 + (2x)^2 = 5 \quad y = 2x = \pm 2$$

$$x^2 + 4x^2 = 5$$

$$5x^2 = 5$$

$$x = \pm 1$$

PTS: 2 REF: 081916aai TOP: Quadratic-Linear Systems

156 ANS:
-3

PTS: 2 REF: 081904aai TOP: Factoring Polynomials
KEY: higher power

157 ANS:
 2π
 $1 = \frac{2\pi}{k}$

$$k = 2\pi$$

PTS: 2 REF: 012313aai TOP: Modeling Trigonometric Functions

158 ANS:
I, II, and III

$$\text{I. } \left(\frac{y}{x^3}\right)^{-1} = \frac{x^3}{y}; \text{ II. } \sqrt[3]{x^9}(y^{-1}) = \frac{x^{\frac{9}{3}}}{y} = \frac{x^3}{y}; \text{ III. } \frac{x^{64}\sqrt{y^8}}{x^3y^3} = \frac{x^3y^{\frac{8}{4}}}{y^3} = \frac{x^3}{y}$$

PTS: 2 REF: 062320aai TOP: Radicals and Rational Exponents

159 ANS:

$$A_0 \left(\frac{1}{2}\right)^{\frac{t}{25}}$$

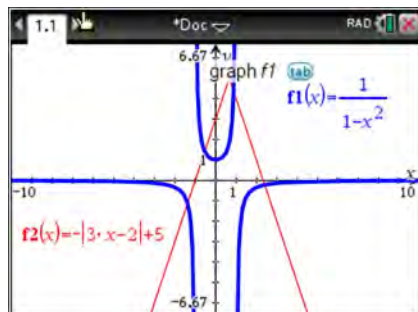
PTS: 2 REF: 082309aai TOP: Modeling Exponential Functions

160 ANS:
\$6166.50

$$5000 \left(1 + \frac{.035}{12}\right)^{12 \cdot 6} \approx 6166.50$$

PTS: 2 REF: 081917aai TOP: Modeling Exponential Functions

161 ANS:
4



PTS: 2 REF: 011924aai TOP: Other Systems

162 ANS:

8.5

$$a_2 = 8 + \log_{2+1} 1 = 8 + 0 = 8$$

$$a_3 = 8 + \log_{3+1} 2 = 8 + \frac{1}{2} = 8.5$$

PTS: 2

REF: 062221aii

TOP: Sequences

KEY: recursive

163 ANS:

$$\frac{85}{295}$$

$$\frac{85}{210 + 85}$$

PTS: 2

REF: 081818aii

TOP: Venn Diagrams

164 ANS:

$$-2 + \ln\left(\frac{7}{5}\right)$$

$$\ln e^{x+2} = \ln \frac{7}{5}$$

$$(x+2) \ln e = \ln \frac{7}{5}$$

$$x = -2 + \ln \frac{7}{5}$$

PTS: 2

REF: 062207aii

TOP: Exponential Equations

KEY: without common base

165 ANS:

$$x^3 - y^3 i$$

$$x^3 - x^2 yi - xy^2 + x^2 yi - xy^2 i^2 - y^3 i = x^3 - xy^2 - xy^2(-1) - y^3 i = x^3 - y^3 i$$

PTS: 2

REF: 062223aii

TOP: Operations with Complex Numbers

166 ANS:

0.07

$$2 \times 0.035 = 0.07 \text{ or } ME = \left(z \sqrt{\frac{p(1-p)}{n}} \right) = \left(1.96 \sqrt{\frac{(0.65)(0.35)}{200}} \right) \approx 0.07$$

PTS: 2

REF: 012319aii

TOP: Analysis of Data

167 ANS:
(3,1)

$$y = -(x-1)^2 + 5 \quad 3+y = 4$$

$$4-x = -x^2 + 2x - 1 + 5 \quad y = 1$$

$$x^2 - 3x = 0$$

$$x(x-3) = 0$$

$$x = 0, 3$$

PTS: 2 REF: 082305aai TOP: Quadratic-Linear Systems

168 ANS:

$$x^2 - 4xi - 4$$

$$(x-2i)(x-2i) = x^2 - 4xi + 4i^2 = x^2 - 4xi - 4$$

PTS: 2 REF: 082202aai TOP: Operations with Complex Numbers

169 ANS:

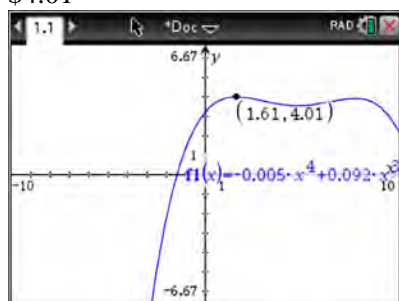
\$1835.98

$$M = \frac{240000 \left(\frac{4.5\%}{12} \right) \left(1 + \frac{4.5\%}{12} \right)^{15 \times 12}}{\left(1 + \frac{4.5\%}{12} \right)^{15 \times 12} - 1} \approx 1835.98$$

PTS: 2 REF: 062209aai TOP: Evaluating Exponential Expressions

170 ANS:

\$4.01



PTS: 2 REF: 011817aai TOP: Graphing Polynomial Functions

171 ANS:

$$d = 5 \sin \left(\frac{\pi}{6} t \right) + 9$$

$$a = \frac{14-4}{2} = 5, d = \frac{14+4}{2} = 9$$

PTS: 2 REF: 061810aai TOP: Modeling Trigonometric Functions

172 ANS:

$$c(x) = 0.2x^2 - 100x + 300$$

$$p(x) = r(x) - c(x)$$

$$-0.5x^2 + 250x - 300 = -0.3x^2 + 150x - c(x)$$

$$c(x) = 0.2x^2 - 100x + 300$$

PTS: 2

REF: 061813aai

TOP: Operations with Functions

173 ANS:

{5,7}

$$x^2 - 4x - 5 = 4x^2 - 40x + 100$$

$$3x^2 - 36x + 105 = 0$$

$$x^2 - 12x + 35 = 0$$

$$(x - 7)(x - 5) = 0$$

$$x = 5, 7$$

PTS: 2

REF: 081807aai

TOP: Solving Radicals

KEY: extraneous solutions

174 ANS:

$$f^{-1}(x) = 2x - 4$$

$$x = \frac{1}{2}y + 2$$

$$2x = y + 4$$

$$y = 2x - 4$$

PTS: 2

REF: 012315aai

TOP: Inverse of Functions

KEY: linear

175 ANS:

5.62

PTS: 2

REF: 081819aai

TOP: Other Systems

176 ANS:

$$f^{-1}(x) = \sqrt[3]{x+2}$$

$$y = x^3 - 2$$

$$x = y^3 - 2$$

$$x + 2 = y^3$$

$$\sqrt[3]{x+2} = y$$

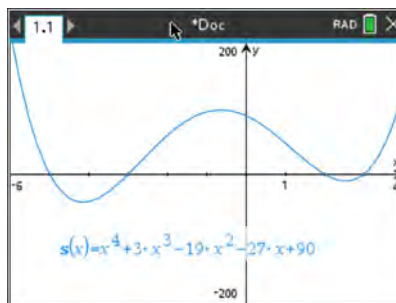
PTS: 2

REF: 061815aai

TOP: Inverse of Functions

KEY: polynomial

177 ANS:
 $\{-5, -3, 2, 3\}$



$$\begin{aligned} s(x) &= x^4 - 9x^2 + 3x^3 - 27x - 10x^2 + 90 \\ &= x^2(x^2 - 9) + 3x(x^2 - 9) - 10(x^2 - 9) \\ &= (x^2 + 3x - 10)(x^2 - 9) \\ &= (x + 5)(x - 2)(x + 3)(x - 3) \end{aligned}$$

PTS: 2 REF: 062303aai TOP: Solving Polynomial Equations

178 ANS:
 $x^2 - 6x + 10 = 0$

The product of the roots equals $(3 + i)(3 - i) = 9 - i^2 = 10 = \frac{c}{a}$. OR

$$(x - (3 + i))(x - (3 - i)) = 0$$

$$(x - 3 - i)(x - 3 + i) = 0$$

$$((x - 3) - i)((x - 3) + i) = 0$$

$$(x - 3)^2 - i^2 = 0$$

$$x^2 - 6x + 9 + 1 = 0$$

$$x^2 - 6x + 10 = 0$$

PTS: 2 REF: 082208aai TOP: Complex Conjugate Root Theorem

179 ANS:
 0

$$\frac{1}{2}x^2 + 2x = \frac{1}{4}x - 8 \quad b^2 - 4ac$$

$$2x^2 + 8x = x - 32 \quad 7^2 - 4(2)(32) < 0$$

$$2x^2 + 7x + 32 = 0$$

PTS: 2 REF: 012310aai TOP: Quadratic-Linear Systems

180 ANS:

$$g_1 = 40$$

$$g_n = \frac{3}{4}g_{n-1}$$

(1) and (3) are not recursive

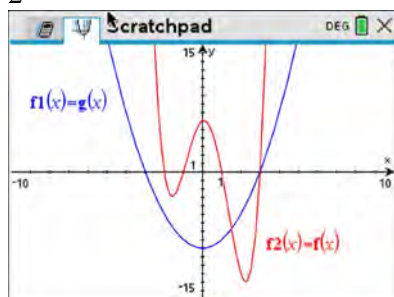
PTS: 2

REF: 012013aai

TOP: Sequences

181 ANS:

2



PTS: 2

REF: 082319aai

TOP: Other Systems

182 ANS:

$$-4 - 8xi$$

$$(2x - i)^2 - (2x - i)(2x + 3i)$$

$$(2x - i)[(2x - i) - (2x + 3i)]$$

$$(2x - i)(-4i)$$

$$-8xi + 4i^2$$

$$-8xi - 4$$

PTS: 2

REF: 011911aai

TOP: Operations with Complex Numbers

183 ANS:

$$-19 - 17i$$

$$-3 + 5i - (4 + 24i - 2i - 12i^2) = -3 + 5i - (16 + 22i) = -19 - 17i$$

PTS: 2

REF: 081815aai

TOP: Operations with Complex Numbers

184 ANS:

3

$$(6 - ki)^2 = 27 - 36i$$

$$36 - 12ki + k^2 i^2 = 27 - 36i$$

$$9 - k^2 - 12ki = -36i$$

Set real part equal to real part: $9 - k^2 = 0$ Set imaginary part equal to imaginary part: $-12ki = -36i$

$$k = \pm 3$$

$$\frac{-12ki}{-12i} = \frac{-36i}{-12i}$$

$$k = 3$$

PTS: 2

REF: 012308aai

TOP: Operations with Complex Numbers

185 ANS:

$$\frac{x^3 \cdot x^{\frac{2}{3}} \cdot x^{\frac{5}{2}}}{x^{\frac{1}{6}}} = \frac{x^{\frac{4}{6}} \cdot x^{\frac{15}{6}}}{x^{\frac{1}{6}}} = x^{\frac{18}{6}} = x^3$$

PTS: 2

REF: 081812aai

TOP: Operations with Radicals

KEY: with variables, index > 2

186 ANS:

$$6\sqrt[3]{x^5}$$

$$4x \cdot x^{\frac{2}{3}} + 2x^{\frac{5}{3}} = 4x^{\frac{5}{3}} + 2x^{\frac{5}{3}} = 6x^{\frac{5}{3}} = 6\sqrt[3]{x^5}$$

PTS: 2

REF: 061820aai

TOP: Operations with Radicals

KEY: with variables, index > 2

187 ANS:

$$h(x) = \log(x + a) + c$$

PTS: 2

REF: 062308aai

TOP: Graphing Logarithmic Functions

188 ANS:

-2

$$f(x) = (x + 1)(x - 1)(x - 2) = (x^2 - 1)(x - 2) = x^3 - 2x^2 - x + 2$$

PTS: 2

REF: 081921aai

TOP: Solving Polynomial Equations

189 ANS:
{8}

$x^2 = 3x + 40$. $x = -5$ is an extraneous solution.

$$x^2 - 3x - 40 = 0$$

$$(x - 8)(x + 5) = 0$$

$$x = 8, -5$$

PTS: 2 REF: 012010aai TOP: Solving Radicals

KEY: extraneous solutions

190 ANS:

$$\frac{64+x}{80+x} = \frac{90}{100}$$

PTS: 2 REF: 082222aai TOP: Modeling Rationals

191 ANS:

\$713,476.20

$$S_7 = \frac{85000 - 85000(1.06)^7}{1 - 1.06} \approx 713476.20$$

PTS: 2 REF: 061905aai TOP: Series KEY: geometric

192 ANS:

0.03

$$ME = \left(z \sqrt{\frac{p(1-p)}{n}} \right) = \left(1.96 \sqrt{\frac{(0.55)(0.45)}{900}} \right) \approx 0.03 \text{ or } \frac{1}{\sqrt{900}} \approx 0.03$$

PTS: 2 REF: 081612aai TOP: Analysis of Data

193 ANS:

$$y = \frac{1}{2} \cos 2x$$

PTS: 2 REF: 061708aai TOP: Modeling Trigonometric Functions

Algebra II Regents Bimodal Worksheets

Answer Section

194 ANS:

$$\frac{157}{229}$$

$$\frac{157}{25 + 47 + 157}$$

PTS: 2

REF: 081607aai

TOP: Conditional Probability

195 ANS:

\$300.36

$$i = \frac{6.24\%}{12} = .52\% \quad R = \frac{(18000)(.52\%)}{1 - (1 + .52\%)^{-12 \cdot 6}} \approx 300.36$$

PTS: 2

REF: 012420aai

TOP: Evaluating Exponential Expressions

196 ANS:

$$\frac{FW}{W - F}$$

$$\frac{1}{J} = \frac{1}{F} - \frac{1}{W}$$

$$\frac{1}{J} = \frac{W - F}{FW}$$

$$J = \frac{FW}{W - F}$$

PTS: 2

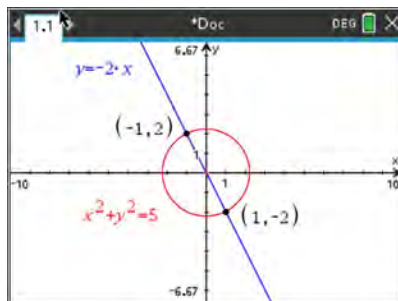
REF: 081617aai

TOP: Solving Rationals

KEY: rational solutions

197 ANS:

(-1, 2)



$$x^2 + (-2x)^2 = 5 \quad y = -2(-1) = 2$$

$$5x^2 = 5$$

$$x^2 = 1$$

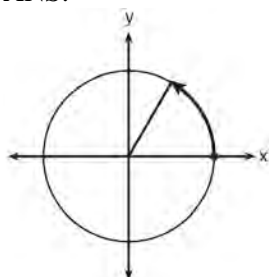
$$x = \pm 1$$

PTS: 2

REF: 012407aai

TOP: Quadratic-Linear Systems

198 ANS:



PTS: 2 REF: 081616aai TOP: Unit Circle KEY: bimodalgraph

199 ANS:

$$y = -\frac{1}{8}(x-2)^2 - 1$$

The vertex is $(2, -1)$ and $p = 2$. $y = -\frac{1}{4(2)}(x-2)^2 - 1$

PTS: 2 REF: 081619aai TOP: Graphing Quadratic Functions

200 ANS:

$$2x^2 + x + 5$$

$$2x-1 \overline{) 4x^3 + 0x^2 + 9x - 5}$$

$$\underline{4x^3 - 2x^2}$$

$$2x^2 + 9x$$

$$\underline{2x^2 - x}$$

$$10x - 5$$

$$\underline{10x - 5}$$

PTS: 2 REF: 081713aai TOP: Rational Expressions

KEY: division

201 ANS:

$$B(t) = 750(1.012)^{12t}$$

$$B(t) = 750 \left(1.16^{\frac{1}{12}} \right)^{12t} \approx 750(1.012)^{12t} \quad B(t) = 750 \left(1 + \frac{0.16}{12} \right)^{12t} \text{ is wrong, because the growth is an annual rate}$$

that is not compounded monthly.

PTS: 2 REF: spr1504aai TOP: Modeling Exponential Functions

202 ANS:

$$\frac{\sqrt{23}}{5}$$

$$\cos \theta = \pm \sqrt{1 - \left(\frac{-\sqrt{2}}{5}\right)^2} = \pm \sqrt{\frac{25}{25} - \frac{2}{25}} = \pm \frac{\sqrt{23}}{5}$$

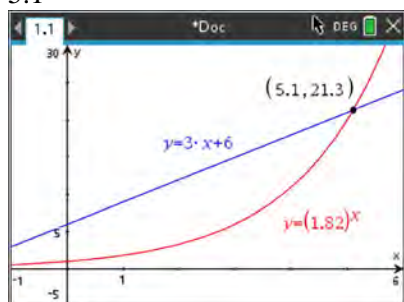
PTS: 2

REF: 061712aii

TOP: Determining Trigonometric Functions

203 ANS:

5.1



PTS: 2

REF: 012406aii

TOP: Other Systems

204 ANS:

$$(1.00427)^m$$

$$1.0525^{\frac{1}{12}} \approx 1.00427$$

PTS: 2

REF: 061621aii

TOP: Modeling Exponential Functions

205 ANS:

$$-\frac{3}{4} + \frac{1}{4}i\sqrt{7}$$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(2)(2)}}{2(2)} = \frac{-3 \pm \sqrt{-7}}{4} = -\frac{3}{4} \pm \frac{i\sqrt{7}}{4}$$

PTS: 2

REF: 061612aii

TOP: Solving Quadratics

KEY: complex solutions | quadratic formula

206 ANS:

$$y = \frac{1}{8}(x-1)^2$$

The vertex is (1,0) and $p = 2$. $y = \frac{1}{4(2)}(x-1)^2 + 0$

PTS: 2

REF: 061717aii

TOP: Graphing Quadratic Functions

207 ANS:

$$V = 120 \sin(120\pi t)$$

$$\text{period} = \frac{2\pi}{B}$$

$$\frac{1}{60} = \frac{2\pi}{B}$$

$$B = 120\pi$$

PTS: 2

REF: 061624aai

TOP: Modeling Trigonometric Functions

208 ANS:

$$a_n = 2 \cdot 3^n$$

PTS: 2

REF: 081618aai

TOP: Sequences

209 ANS:

II, only

The events are independent because $P(A \text{ and } B) = P(A) \cdot P(B)$.

$$0.125 = 0.5 \cdot 0.25$$

If $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = 0.25 + 0.5 - .125 = 0.625$, then the events are not mutually exclusive because $P(A \text{ or } B) = P(A) + P(B)$

$$0.625 \neq 0.5 + 0.25$$

PTS: 2

REF: 061714aai

TOP: Theoretical Probability

210 ANS:

$$2x^2 - 3x + 7 - \frac{11}{2x+3}$$

$$2x+3 \overline{) \begin{array}{r} 2x^2 - 3x + 7 \\ 4x^3 + 0x^2 + 5x + 10 \end{array}}$$

$$\underline{4x^3 + 6x^2}$$

$$-6x^2 + 5x$$

$$\underline{-6x^2 - 9x}$$

$$14x + 10$$

$$\underline{14x + 21}$$

$$-11$$

PTS: 2

REF: 061614aai

TOP: Rational Expressions

KEY: division

211 ANS:

I, II, and III

PTS: 2

REF: 061716aai

TOP: Radicals and Rational Exponents

KEY: variables

212 ANS:

$$6 \pm 2i$$

$$-2 \left(-\frac{1}{2}x^2 = -6x + 20 \right)$$

$$x^2 - 12x = -40$$

$$x^2 - 12x + 36 = -40 + 36$$

$$(x - 6)^2 = -4$$

$$x - 6 = \pm 2i$$

$$x = 6 \pm 2i$$

PTS: 2 REF: fall1504aii TOP: Solving Quadratics

KEY: complex solutions | completing the square

213 ANS:

$$g_1 = 18$$

$$g_n = \frac{1}{2} g_{n-1}$$

(2) is not recursive

PTS: 2 REF: 081608aii TOP: Sequences

214 ANS:

$$2d(d+3)^2(d-3)$$

$$2d(d^3 + 3d^2 - 9d - 27)$$

$$2d(d^2(d+3) - 9(d+3))$$

$$2d(d^2 - 9)(d+3)$$

$$2d(d+3)(d-3)(d+3)$$

$$2d(d+3)^2(d-3)$$

PTS: 2 REF: 081615aii TOP: Factoring Polynomials

KEY: factoring by grouping

215 ANS:

$$\{(1,1), (6,16)\}$$

$$y = g(x) = (x-2)^2 \quad (x-2)^2 = 3x-2 \quad y = 3(6) - 2 = 16$$

$$x^2 - 4x + 4 = 3x - 2 \quad y = 3(1) - 2 = 1$$

$$x^2 - 7x + 6 = 0$$

$$(x-6)(x-1) = 0$$

$$x = 6, 1$$

PTS: 2 REF: 011705aii TOP: Quadratic-Linear Systems

216 ANS:

$$300e^{-0.87}$$

$$\frac{A}{P} = e^{rt}$$

$$0.42 = e^{rt}$$

$$\ln 0.42 = \ln e^{rt}$$

$$-0.87 \approx rt$$

PTS: 2

REF: 011723aii

TOP: Modeling Exponential Functions

217 ANS:

56

$$P(28) = 5(2)^{\frac{98}{28}} \approx 56$$

PTS: 2

REF: 011702aii

TOP: Modeling Exponential Functions

218 ANS:

$$f(x) = -\frac{4}{3}x + \frac{8}{3}$$

$$x = -\frac{3}{4}y + 2$$

$$-4x = 3y - 8$$

$$-4x + 8 = 3y$$

$$-\frac{4}{3}x + \frac{8}{3} = y$$

PTS: 2

REF: 061616aii

TOP: Inverse of Functions

KEY: linear

219 ANS:

$$3x^2 + 4x - 1 + \frac{5}{2x+3}$$

$$2x+3 \overline{) \begin{array}{r} 3x^2 + 4x - 1 \\ 6x^3 + 17x^2 + 10x + 2 \end{array}}$$

$$\underline{6x^3 + 9x^2}$$

$$8x^2 + 10x$$

$$\underline{8x^2 + 12x}$$

$$-2x + 2$$

$$\underline{-2x - 3}$$

$$5$$

PTS: 2

REF: fall1503aii

TOP: Rational Expressions

KEY: division

220 ANS:

$$x = \frac{\ln 6}{\ln 2} - 3$$

$$8(2^{x+3}) = 48$$

$$2^{x+3} = 6$$

$$(x+3)\ln 2 = \ln 6$$

$$x+3 = \frac{\ln 6}{\ln 2}$$

$$x = \frac{\ln 6}{\ln 2} - 3$$

PTS: 2 REF: 061702aai TOP: Exponential Equations

KEY: without common base

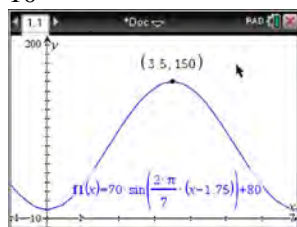
221 ANS:

$$ac(bd)^x$$

PTS: 2 REF: 011710aai TOP: Operations with Functions

222 ANS:

10



$H(t)$ is at a minimum at $70(-1) + 80 = 10$

PTS: 2 REF: 061613aai TOP: Graphing Trigonometric Functions

KEY: maximum/minimum

223 ANS:

$$x^2 = -4y$$

The vertex of the parabola is $(0,0)$. The distance, p , between the vertex and the focus or the vertex and the

directrix is 1. $y = \frac{-1}{4p}(x-h)^2 + k$

$$y = \frac{-1}{4(1)}(x-0)^2 + 0$$

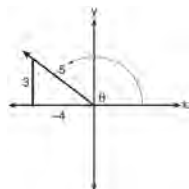
$$y = -\frac{1}{4}x^2$$

PTS: 2 REF: 081706aai TOP: Graphing Quadratic Functions

224 ANS:

$$\frac{3}{5}$$

A reference triangle can be sketched using the coordinates $(-4, 3)$ in the second quadrant to find the value of $\sin \theta$.



PTS: 2 REF: spr1503aii TOP: Determining Trigonometric Functions
KEY: extension to reals

225 ANS:

(7.02, 12.62)

 $9.82 \pm 2(1.4)$

PTS: 2 REF: 012411aii TOP: Analysis of Data

226 ANS:

very loud

$$d = 10 \log \frac{6.3 \times 10^{-3}}{1.0 \times 10^{-12}} \approx 98$$

PTS: 2 REF: 011715aii TOP: Evaluating Logarithmic Expressions

227 ANS:

 $-x - 5$

$$\frac{f(x)}{g(x)} = \frac{2x^2 + 7x - 15}{3 - 2x} = \frac{(2x - 3)(x + 5)}{-(2x - 3)} = \frac{x + 5}{-1} = -x - 5$$

PTS: 2 REF: 012412aii TOP: Operations with Functions

228 ANS:

{2}

$$\sqrt{x + 14} = \sqrt{2x + 5} + 1 \qquad \sqrt{22 + 14} - \sqrt{2(22) + 5} = 1$$

$$x + 14 = 2x + 5 + 2\sqrt{2x + 5} + 1 \qquad 6 - 7 \neq 1$$

$$-x + 8 = 2\sqrt{2x + 5}$$

$$x^2 - 16x + 64 = 8x + 20$$

$$x^2 - 24x + 44 = 0$$

$$(x - 22)(x - 2) = 0$$

$$x = 2, 22$$

PTS: 2 REF: 081704aii TOP: Solving Radicals
KEY: advanced

229 ANS:
 $P_0 = 19,378,000$

$$P_t = 1.015P_{t-1}$$

PTS: 2 REF: 081624aai TOP: Sequences

230 ANS:
 $300(1.30)^{\frac{365}{14}}$

PTS: 2 REF: 081622aai TOP: Modeling Exponential Functions

231 ANS:
 $\frac{255 + 93T}{T + 3} = 90$

PTS: 2 REF: 061602aai TOP: Modeling Rationals

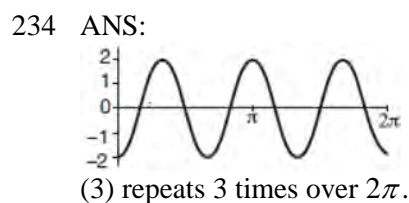
232 ANS:
 $y = \frac{1}{4}(x + 3)^2 + 1$

Distance from the focus to the directrix is 2, so $p = 1$. Vertex is $(-3, 1)$. $y = \frac{1}{4(1)}(x + 3)^2 + 1$

PTS: 2 REF: 012409aai TOP: Graphing Quadratic Functions

233 ANS:
 $a_0 = 1000$
 $a_n = a_{n-1}(1.018) + 750$

PTS: 2 REF: 081724aai TOP: Sequences



PTS: 2 REF: 011722aai TOP: Graphing Trigonometric Functions
 KEY: recognize | bimodalgraph

235 ANS:
 32°

PTS: 2 REF: 011704aai TOP: Proving Trigonometric Identities
 KEY: basic

236 ANS:

$$\frac{-1}{(x+3)(x-4)} + \frac{3(x+3)}{(x-4)(x+3)} = \frac{2x-2}{x^2-x-12}$$

$$2x-8+3x+9=2x-2$$

$$3x=-3$$

$$x=-1$$

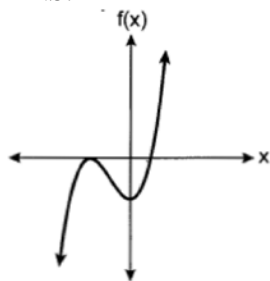
PTS: 2

REF: 011717aii

TOP: Solving Rationals

KEY: rational solutions

237 ANS:



PTS: 2

REF: 012405aii

TOP: Graphing Polynomial Functions

238 ANS:

$$x^2 + 1 + \frac{4}{x+2}$$

$$\frac{x^2 + 0x + 1}{x+2} \overline{) x^3 + 2x^2 + x + 6}$$

$$\underline{x^3 + 2x^2}$$

$$0x^2 + x$$

$$\underline{0x^2 + 0x}$$

$$x + 6$$

$$\underline{x + 2}$$

$$4$$

PTS: 2

REF: 081611aii

TOP: Rational Expressions

KEY: division

239 ANS:

$$-24x^2 - 30xi$$

$$6xi^3(-4xi+5) = -24x^2i^4 + 30xi^3 = -24x^2(1) + 30x(-1) = -24x^2 - 30xi$$

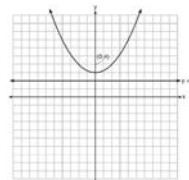
PTS: 2

REF: 061704aii

TOP: Operations with Complex Numbers

240 ANS:

$$y = \frac{x^2}{4} + 3$$



A parabola with a focus of $(0,4)$ and a directrix of $y = 2$ is sketched as follows: By inspection, it is determined that the vertex of the parabola is $(0,3)$. It is also evident that the distance, p , between the vertex and the focus is 1. It is possible to use the formula $(x - h)^2 = 4p(y - k)$ to derive the equation of the parabola as follows: $(x - 0)^2 = 4(1)(y - 3)$

$$x^2 = 4y - 12$$

$$x^2 + 12 = 4y$$

$$\frac{x^2}{4} + 3 = y$$

or A point (x,y) on the parabola must be the same distance from the focus as it is from the directrix. For any such point (x,y) , the distance to the focus is $\sqrt{(x - 0)^2 + (y - 4)^2}$ and the distance to the directrix is $y - 2$. Setting this equal leads to: $x^2 + y^2 - 8y + 16 = y^2 - 4y + 4$

$$x^2 + 16 = 4y + 4$$

$$\frac{x^2}{4} + 3 = y$$

PTS: 2 REF: spr1502aii TOP: Graphing Quadratic Functions

241 ANS:
 496 ± 230
 $496 \pm 2(115)$

PTS: 2 REF: 011718aii TOP: Normal Distributions
 KEY: interval

242 ANS:
 $-0.15x^3 - 0.02x^2 + 28x - 120$
 $x(30 - 0.01x) - (0.15x^3 + 0.01x^2 + 2x + 120) = 30x - 0.01x^2 - 0.15x^3 - 0.01x^2 - 2x - 120$
 $= -0.15x^3 - 0.02x^2 + 28x - 120$

PTS: 2 REF: 061709aii TOP: Operations with Functions

243 ANS:
 $p(x) = (x^2 - 9)(x - 2)$

PTS: 2 REF: 061701aii TOP: Graphing Polynomial Functions

244 ANS:

-5 and 0

$$\begin{array}{cccccc} 3 & 1 & -1 & -21 & 45 & 0 \\ & & 3 & 6 & -45 & 0 \\ & & 1 & 2 & -15 & 0 & 0 \end{array}$$

$$x^3 + 2x^2 - 15x = 0$$

$$x(x^2 + 2x - 15) = 0$$

$$x(x + 5)(x - 3) = 0$$

$$x = 0, -5, 3$$

PTS: 2

REF: 012403aai

TOP: Solving Polynomial Equations

245 ANS:

149

$$d = 32(.8)^{b-1} \quad S_n = \frac{32 - 32(.8)^{12}}{1 - .8} \approx 149$$

PTS: 2

REF: 081721aai

TOP: Series

KEY: geometric

246 ANS:

$$-y^2 - 4yi + 4$$

$$(2 - yi)(2 - yi) = 4 - 4yi + y^2 i^2 = -y^2 - 4yi + 4$$

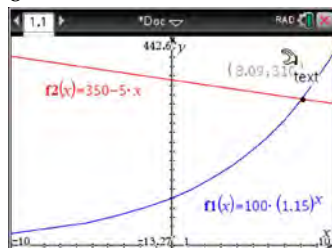
PTS: 2

REF: 061603aai

TOP: Operations with Complex Numbers

247 ANS:

8



PTS: 2

REF: 011716aai

TOP: Other Systems

248 ANS:

$$f^{-1}(x) = \frac{2x+1}{x-1}$$

$$x = \frac{y+1}{y-2}$$

$$xy - 2x = y + 1$$

$$xy - y = 2x + 1$$

$$y(x-1) = 2x+1$$

$$y = \frac{2x+1}{x-1}$$

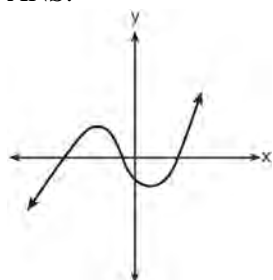
PTS: 2

REF: 081714aii

TOP: Inverse of Functions

KEY: rational

249 ANS:



The graph shows three real zeros, and has end behavior matching the given end behavior.

PTS: 2

REF: 061604aii

TOP: Graphing Polynomial Functions

KEY: bimodalgraph

250 ANS:

$$A = 100(0.990656)^t$$

$$\left(\frac{1}{2}\right)^{\frac{1}{73.83}} \approx 0.990656$$

PTS: 2

REF: 081710aii

TOP: Modeling Exponential Functions

251 ANS:

$$\begin{array}{r}
 2x^3 + 6x^2 + 13x + 42 + \frac{124}{x-3} \\
 x-3 \overline{) \begin{array}{r} 2x^3 + 6x^2 + 13x + 42 \\ 2x^4 + 0x^3 - 5x^2 + 3x - 2 \\ \hline 2x^4 - 6x^3 \\ \hline 6x^3 - 5x^2 \\ \hline 6x^3 - 18x^2 \\ \hline 13x^2 + 3x \\ \hline 13x^2 - 39x \\ \hline 42x - 2 \\ \hline 42x - 126 \\ \hline 124 \end{array}
 \end{array}$$

PTS: 2 REF: 012408aai TOP: Rational Expressions

KEY: division

252 ANS:

$$\begin{array}{l}
 \{7\} \\
 \sqrt{56-x} = x \quad -8 \text{ is extraneous.} \\
 56-x = x^2 \\
 0 = x^2 + x - 56 \\
 0 = (x+8)(x-7) \\
 x = 7
 \end{array}$$

PTS: 2 REF: 061605aai TOP: Solving Radicals

KEY: extraneous solutions

253 ANS:

2450

$$\log_{0.8} \left(\frac{V}{17000} \right) = t \quad \frac{17,000(0.8)^3 - 17,000(0.8)^1}{3-1} \approx -2450$$

$$0.8^t = \frac{V}{17000}$$

$$V = 17000(0.8)^t$$

PTS: 2 REF: 081709aai TOP: Rate of Change

254 ANS:

$$8\sqrt{6}$$

$$r = \frac{-2\sqrt{3}}{\sqrt{6}} = \frac{-2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{-2\sqrt{2}}{2} = -\sqrt{2} \quad a_7 = \sqrt{6}(-\sqrt{2})^{7-1} = \sqrt{6}(-\sqrt{2})^6 = \sqrt{6} \cdot 2^3 = 8\sqrt{6}$$

PTS: 2 REF: 012410aai TOP: Sequences KEY: explicit

255 ANS:

0

Since $x + 4$ is a factor of $p(x)$, there is no remainder.

PTS: 2 REF: 081621aai TOP: Remainder and Factor Theorems

256 ANS:

$$\pm \frac{7i\sqrt{2}}{2}$$

$$4x^2 = -98$$

$$x^2 = -\frac{98}{4}$$

$$x^2 = -\frac{49}{2}$$

$$x = \pm \sqrt{-\frac{49}{2}} = \pm \frac{7i}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \pm \frac{7i\sqrt{2}}{2}$$

PTS: 2 REF: 061707aai TOP: Solving Quadratics

KEY: complex solutions | taking square roots

257 ANS:

B and D

The maximum volume of $p(x) = -(x+2)(x-10)(x-14)$ is about 56, at $x = 12.1$

PTS: 2 REF: 081712aai TOP: Graphing Polynomial Functions

258 ANS:

-0.26

$$\frac{f(7) - f(-7)}{7 - (-7)} = \frac{2^{-0.25(7)} \cdot \sin\left(\frac{\pi}{2}(7)\right) - 2^{-0.25(-7)} \cdot \sin\left(\frac{\pi}{2}(-7)\right)}{14} \approx -0.26$$

PTS: 2 REF: 061721aai TOP: Rate of Change

259 ANS:

2 or -4

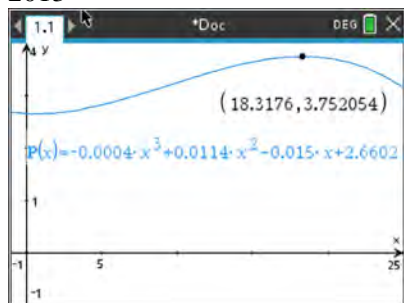
$$x^2 + 2x - 8 = 0$$

$$(x+4)(x-2) = 0$$

$$x = -4, 2$$

PTS: 2 REF: 081701aai TOP: Undefined Rationals

260 ANS:
2013



PTS: 2 REF: 012414aai TOP: Graphing Polynomial Functions

261 ANS:
 $y = 3^x$

PTS: 2 REF: 011708aai TOP: Inverse of Functions
KEY: exponential

262 ANS:

$$9k^2 - 12ki - 4$$

$$(3k - 2i)^2 = 9k^2 - 12ki + 4i^2 = 9k^2 - 12ki - 4$$

PTS: 2 REF: 081702aai TOP: Operations with Complex Numbers

263 ANS:

$$(k + 2)(k - 2)(k + 6)(k + 2)$$

$$k^4 - 4k^2 + 8k^3 - 32k + 12k^2 - 48$$

$$k^2(k^2 - 4) + 8k(k^2 - 4) + 12(k^2 - 4)$$

$$(k^2 - 4)(k^2 + 8k + 12)$$

$$(k + 2)(k - 2)(k + 6)(k + 2)$$

PTS: 2 REF: fall1505aai TOP: Factoring Polynomials
KEY: factoring by grouping

264 ANS:
 $f(n) = -8.75 + 0.75n$

PTS: 2 REF: 061720aai TOP: Sequences KEY: function notation

265 ANS:

$$\log_{\frac{1}{2}}(p) = q$$

PTS: 2 REF: 012404aai TOP: Express Exponentials as Logarithms

266 ANS:

$$-\frac{5}{3}$$

$$\cos \theta = -\frac{3}{5}; \sec \theta = -\frac{5}{3}$$

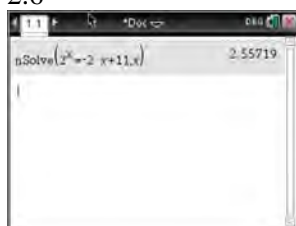
PTS: 2

REF: 012421aii

TOP: Determining Trigonometric Functions

267 ANS:

2.6



PTS: 2

REF: 081603aii

TOP: Other Systems

268 ANS:

$$\frac{\pi}{3} \text{ left}$$

PTS: 2

REF: 011701aii

TOP: Graphing Trigonometric Functions

269 ANS:

$$-1 + 2i \text{ and } -1 - 2i$$

$$x^2 + 2x + 1 = -5 + 1$$

$$(x + 1)^2 = -4$$

$$x + 1 = \pm 2i$$

$$x = -1 \pm 2i$$

PTS: 2

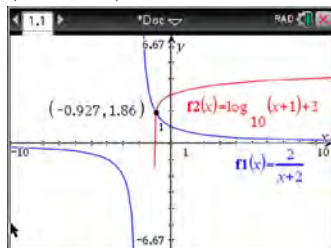
REF: 081703aii

TOP: Solving Quadratics

KEY: complex solutions | completing the square

270 ANS:

(-0.9, 1.9)



PTS: 2

REF: 011712aii

TOP: Other Systems

271 ANS:

I and III

$$(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3 \neq x^3 + 3xy + y^3$$

PTS: 2

REF: 081620aai

TOP: Polynomial Identities

272 ANS:

-1

$$y = x^3 - 3$$

$$x = y^3 - 3$$

$$x + 3 = y^3$$

$$\sqrt[3]{x+3} = y$$

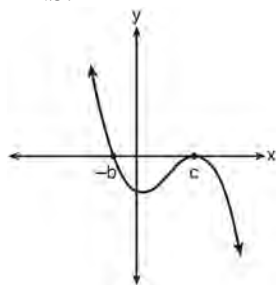
PTS: 2

REF: 012419aai

TOP: Inverse of Functions

KEY: polynomial

273 ANS:



The zeros of the polynomial are at $-b$, and c . The sketch of a polynomial of degree 3 with a negative leading coefficient should have end behavior showing as x goes to negative infinity, $f(x)$ goes to positive infinity. The multiplicities of the roots are correctly represented in the graph.

PTS: 2

REF: spr1501aai

TOP: Graphing Polynomial Functions

KEY: bimodalgraph

274 ANS:

$$m(m^2 + 3)(m^2 - 2)$$

$$m^5 + m^3 - 6m = m(m^4 + m^2 - 6) = m(m^2 + 3)(m^2 - 2)$$

PTS: 2

REF: 011703aai

TOP: Factoring Polynomials

KEY: higher power

275 ANS:

48



$\bar{x} + 2\sigma$ represents approximately 48% of the data.

PTS: 2

REF: 061609aai

TOP: Normal Distributions

KEY: percent

276 ANS:

$$H(t) = 50(1.015)^{12t}$$

$$50(1.19^{\frac{1}{12}})^{12t} \approx 50(1.015)^{12t}$$

PTS: 2

REF: 012424aai

TOP: Modeling Exponential Functions

277 ANS:

left a units, down b units

PTS: 2

REF: 061706aai

TOP: Graphing Trigonometric Functions

278 ANS:

0.8415



PTS: 2

REF: 081604aai

TOP: Normal Distributions

KEY: probability

279 ANS:

$$C(n) = \frac{329.99 + 108.78n}{n}$$

PTS: 2

REF: 061722aai

TOP: Modeling Rationals

280 ANS:

$$-3 \pm i$$

$$x^2 + 6x + 9 = -10 + 9$$

$$(x + 3)^2 = -1$$

$$x + 3 = \pm i$$

$$x = -3 \pm i$$

PTS: 2 REF: 012416aai TOP: Solving Quadratics

KEY: complex solutions | completing the square

281 ANS:

II, only

The 2010 population is 110 million.

PTS: 2 REF: 061718aai TOP: Modeling Exponential Functions

282 ANS:

$$x^2 - 2x + 2 = 0$$

If $1 - i$ is one solution, the other is $1 + i$. $(x - (1 - i))(x - (1 + i)) = 0$

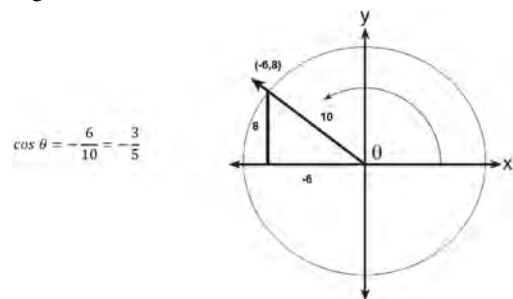
$$x^2 - x - ix - x + ix + (1 - i^2) = 0$$

$$x^2 - 2x + 2 = 0$$

PTS: 2 REF: 081601aai TOP: Complex Conjugate Root Theorem

283 ANS:

$$-\frac{3}{5}$$



PTS: 2 REF: 061617aai TOP: Determining Trigonometric Functions

KEY: extension to reals

284 ANS:
0.0668



PTS: 2 REF: 081711aii TOP: Normal Distributions
KEY: percent

285 ANS:
140

$$F = 325 - 185e^{-0.4(0)} = 325 - 185 = 140$$

PTS: 2 REF: 012415aii TOP: Evaluating Exponential Expressions

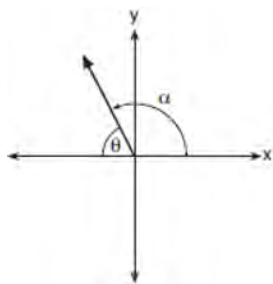
286 ANS:

$$\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$$

$$x = \frac{8 \pm \sqrt{(-8)^2 - 4(6)(29)}}{2(6)} = \frac{8 \pm \sqrt{-632}}{12} = \frac{8 \pm i\sqrt{4}\sqrt{158}}{12} = \frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$$

PTS: 2 REF: 011711aii TOP: Solving Quadratics
KEY: complex solutions | quadratic formula

287 ANS:



PTS: 2 REF: 081707aii TOP: Reference Angles
KEY: bimodalgraph

288 ANS:

$$P = 714(0.9716)^y$$

$$0.75^{\frac{1}{10}} \approx .9716$$

PTS: 2 REF: 061713aii TOP: Modeling Exponential Functions

289 ANS:

proportion $\approx .16$; margin of error $\approx .02$

$$\frac{212}{1334} \approx .16 \quad ME = \left(z \sqrt{\frac{p(1-p)}{n}} \right) = \left(1.96 \sqrt{\frac{(0.16)(0.84)}{1334}} \right) \approx 0.02 \quad \text{or} \quad \frac{1}{\sqrt{1334}} \approx .027$$

PTS: 2

REF: 081716aii

TOP: Analysis of Data

290 ANS:

$$\left\{ -\frac{7}{2}, -3 \right\}$$

$$x(x+7) \left[\frac{3x+25}{x+7} - 5 = \frac{3}{x} \right]$$

$$x(3x+25) - 5x(x+7) = 3(x+7)$$

$$3x^2 + 25x - 5x^2 - 35x = 3x + 21$$

$$2x^2 + 13x + 21 = 0$$

$$(2x+7)(x+3) = 0$$

$$x = -\frac{7}{2}, -3$$

PTS: 2

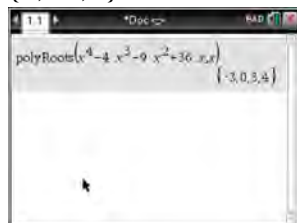
REF: fall1501aii

TOP: Solving Rationals

KEY: rational solutions

291 ANS:

$$\{0, \pm 3, 4\}$$



$$x^4 - 4x^3 - 9x^2 + 36x = 0$$

$$x^3(x-4) - 9x(x-4) = 0$$

$$(x^3 - 9x)(x-4) = 0$$

$$x(x^2 - 9)(x-4) = 0$$

$$x(x+3)(x-3)(x-4) = 0$$

$$x = 0, \pm 3, 4$$

PTS: 2

REF: 061606aii

TOP: Solving Polynomial Equations

292 ANS:

$$j_1 = 250,000$$

$$j_n = 1.00375j_{n-1}$$

PTS: 2

REF: 061623aii

TOP: Sequences

293 ANS:

2, -2, i , and $-i$

PTS: 2

REF: 081708aii

TOP: Solving Polynomial Equations