NAME:_____

1. 060722b, P.I. A2.S.7
The accompanying table shows the enrollment of a preschool from 1980 through 2000. Write a linear regression equation to model the data in the table.

Year (x)	Enrollment (y)
1980	14
1985	20
1990	22
1995	28
2000	37

2. 060927b, P.I. A2.S.7
The number of newly reported crime cases in a county in New York State is shown in the accompanying table. Write the linear regression equation that represents this set of data. (Let $x = 0$ represent 1999.) Using this equation, find the projected number of new cases for 2009, rounded to the *nearest whole number*.

Year (x)	New Cases (y)
1999	440
2000	457
2001	369
2002	351

3. 080728b, P.I. A2.S.7
The accompanying table shows the percent of the adult population that married before age 25 in several different years. Using the year as the independent variable, find the linear regression equation. Round the regression coefficients to the *nearest hundredth*. Using the equation found above, estimate the percent of the adult population in the year 2009 that will marry before age 25, and round to the *nearest tenth of a percent*.

Year (x)	Percent (y)
1971	42.4
1976	37.4
1980	37.1
1984	34.1
1989	32.1
1993	28.8
1997	25.7
2000	25.5

4. 010530b, P.I. A2.S.7
A real estate agent plans to compare the price of a cottage, y, in a town on the seashore to the number of blocks, x, the cottage is from the beach. The accompanying table shows a random sample of sales and location data. Write a linear regression equation that relates the price of a cottage to its distance from the beach. Use the equation to predict the price of a cottage, to the *nearest dollar*, located three blocks from the beach.

Number of Blocks from the Beach (x)	Price of a Cottage (y)
5	$132,000
0	$310,000
4	$204,000
2	$238,000
1	$275,000
7	$60,800

NAME:_____

5. 060631b, P.I. A2.S.7

A factory is producing and stockpiling metal sheets to be shipped to an automobile manufacturing plant. The factory ships only when there is a minimum of 2,050 sheets in stock. The accompanying table shows the day, x, and the number of sheets in stock, $f(x)$.

Day (x)	Sheets in Stock ($f(x)$)
1	860
2	930
3	1000
4	1150
5	1200
6	1360

Write the linear regression equation for this set of data, rounding the coefficients to *four decimal places*. Use this equation to determine the day the sheets will be shipped.

6. 010328b, P.I. A2.S.7

In a mathematics class of ten students, the teacher wanted to determine how a homework grade influenced a student's performance on the subsequent test. The homework grade and subsequent test grade for each student are given in the accompanying table.

Homework Grade (x)	Test Grade (y)
94	98
95	94
92	95
87	89
82	85
80	78
75	73
65	67
50	45
20	40

a Give the equation of the linear regression line for this set of data.

b A new student comes to the class and earns a homework grade of 78. Based on the equation in part *a*, what grade would the teacher predict the student would receive on the subsequent test, to the *nearest integer*?

NAME:_____

7. 080533b, P.I. A2.S.7
The accompanying table illustrates the number of movie theaters showing a popular film and the film's weekly gross earnings, in millions of dollars.

Number of Theaters (x)	Gross Earnings (y) (millions of dollars)
443	2.57
455	2.65
493	3.73
530	4.05
569	4.76
657	4.76
723	5.15
1,064	9.35

Write the linear regression equation for this set of data, rounding values to *five decimal places*. Using this linear regression equation, find the approximate gross earnings, in millions of dollars, generated by 610 theaters. Round your answer to *two decimal places.* Find the minimum number of theaters that would generate at least 7.65 million dollars in gross earnings in one week.

8. 080133b, P.I. A2.S.7
The availability of leaded gasoline in New York State is decreasing, as shown in the accompanying table.

Year	1984	1988	1992	1996	2000
Gallons Available (in thousands)	150	124	104	76	50

Determine a linear relationship for x (years) versus y (gallons available), based on the data given. The data should be entered using the year and gallons available (in thousands), such as (1984,150). If this relationship continues, determine the number of gallons of leaded gasoline available in New York State in the year 2005. If this relationship continues, during what year will leaded gasoline first become unavailable in New York State?

9. 010633b, P.I. A2.S.7
Since 1990, fireworks usage nationwide has grown, as shown in the accompanying table, where t represents the number of years since 1990, and p represents the fireworks usage per year, in millions of pounds.

Number of Years Since 1990 (t)	Fireworks Usage per Year, In Millions of Pounds (p)
0	67.6
2	88.8
4	119.0
6	120.1
7	132.5
8	118.3
9	159.2
11	161.6

Find the equation of the linear regression model for this set of data, where t is the independent variable. Round values to *four decimal places*. Using this equation, determine in what year fireworks usage would have reached 99 million pounds. Based on this linear model, how many millions of pounds of fireworks would be used in the year 2008? Round your answer to the *nearest tenth*.

10. 060134b, P.I. A2.S.7
The 1999 win-loss statistics for the American League East baseball teams on a particular date is shown in the accompanying chart.

	W	L
New York	52	34
Boston	49	39
Toronto	47	43
Tampa Bay	39	49
Baltimore	36	51

Find the mean for the number of wins, $\overline{W}$, and the mean for the number of losses, $\overline{L}$, and determine if the point ($\overline{W}$, $\overline{L}$) is a point on the line of best fit. Justify your answer.

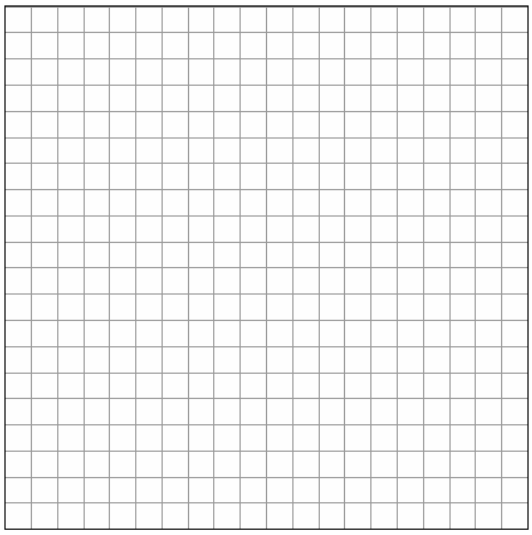
NAME:_____

11. 080331b, P.I. A2.S.7

The table below shows the results of an experiment that relates the height at which a ball is dropped, x, to the height of its first bounce, y.

Drop Height (x) (cm)	Bounce Height (y) (cm)
100	26
90	23
80	21
70	18
60	16

Find $\bar{x}$, the mean of the drop heights. Find $\bar{y}$, the mean of the bounce heights. Find the linear regression equation that best fits the data. Show that $(\bar{x}, \bar{y})$ is a point on the line of regression. [The use of the grid is optional.]

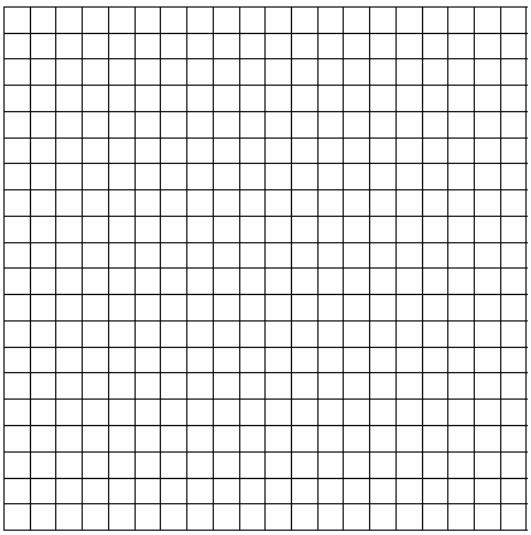


12. 010234b, P.I. A2.S.7

Two different tests were designed to measure understanding of a topic. The two tests were given to ten students with the following results:

Test x	75	78	88	92	95	67	58	72	74	81
Test y	81	73	85	88	89	73	66	75	70	78

Construct a scatter plot for these scores, and then write an equation for the line of best fit (round slope and intercept to the *nearest hundredth*).



Find the correlation coefficient.
Predict the score, to the *nearest integer*, on test y for a student who scored 87 on test x.

[2] $y = 1.08x - 2125$ or an equivalent equation is written.
[1] One conceptual error is made, such as writing a regression equation that is not linear.
or [1] The expression $1.08x - 2125$ is written, but no equation is written.
or [1] The correct values are identified for a and b, but no equation is written.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[1]

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[4] $y = -35.5x + 457.5$ and 103, and appropriate work is shown, such as substituting 10 into the regression equation.
[3] Appropriate work is shown, but one computational, rounding, or substitution error is made.
or [3] The expression $-35.5x + 457.5$ is written and 103, and appropriate substitution is shown, but no equation is written.
or [3] $y = -35.5x + 457.5$ and 103, but no substitution is shown.
[2] Appropriate work is shown, but two or more computational, rounding, or substitution errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] An incorrect linear regression equation is written, but an appropriate number of new cases is found.
or [2] $y = -35.5x + 457.5$, but no further correct work is shown.
or [2] The expression -35.5x + 457.5 is written and 103, but no substitution is shown.
[1] Appropriate work is shown, but one conceptual error and one computational, rounding, or substitution error are made.
or [1] The expression $-35.5x + 457.5$ is written or 103, but no substitution is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2]

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[4] $y = -0.58x + 1185.09$ and 19.9, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] A correct linear equation is written, but no further correct work is shown.
or [2] An incorrect linear equation is written, but an appropriate percentage is found.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] 19.9, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[3]

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[4] $y = -34739.71292x + 313309.0909$ and 209,090, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] An incorrect linear equation with a negative slope is written, but an appropriate price is found for three blocks from the beach.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] A correct linear function is written, but no further correct work is shown.
or [2] An incorrect linear equation with a positive slope is written, but an appropriate price is found for three blocks from the beach.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] 209,090, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4]

[4] f(x) = 98.8571x + 737.3333 or y = 98.8571x + 737.3333 and day 14, and appropriate substitution is made, such as 2050 = 98.8571x + 737.3333.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] A correct linear regression equation is written and day 14, but no substitution is made.
or [3] The expression 98.8571x + 737.3333 is written and day 14, and appropriate substitution is made, but no equation is written.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] A correct linear regression equation is written, but no further correct work is shown.
or [2] An incorrect equation of equal difficulty is solved appropriately.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] The expression 98.8571x + 737.3333 is written, but no further correct work is shown.
or [1] Day 14, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[5]

[4] a y = 0.8344648562x + 14.64960064 or an equivalent answer expressed to three significant digits
and b 80, and appropriate work is shown.
[3] One computational error is made or one rounding error is made with one of the numbers in the equation, such as truncating or not giving at least three significant digits.
[2] Only the correct answer for either part a or part b is found.
or [2] Appropriate work is shown, but more than one computational or rounding error is made.
[1] 78 is substituted into an incorrect linear equation, but it is evaluated appropriately.
or [1] y = 0.8344648562x + 14.64960064 and 80, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[6]

[6] $y = 0.01021x - 1.66787$, 4.56, and 913, and appropriate work is shown.
[5] Appropriate work is shown, but one computational or rounding error is made.
or [5] The expression $0.01021x - 1.66787$ is written and 4.56 and 913 are found, and appropriate work is shown.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
or [4] A correct equation is written, but either the gross earnings or the number of theaters is not found, but appropriate work is shown.
or [4] An incorrect equation of equal difficulty is written, but appropriate answers are found, and appropriate work is shown.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] $y = 0.01021x - 1.66787$, 4.56, and 913, but no work is shown.
or [3] The expression $0.01021x - 1.66787$ is written and either 4.56 or 913 is found, and appropriate work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] A correct equation is written, but no further correct work is shown.
[1] 4.56 and 913, but no work is shown.
or [1] The expression $0.01021x - 1.66787$ is written, but no further correct work is shown.
[0] Either 4.56 or 913, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[7]

[6] $y = -6.2x + 12{,}451.2$; 20.2 thousand; and 2008; and appropriate work is shown.
[5] The correct equation is shown, but only the number of gallons or the year is correct.
[4] The slope and y-intercept are incorrect, but the slope is negative and the number of gallons and the year are appropriate, based on the incorrect equation.
[3] The slope and y-intercept are incorrect, but the slope is negative, but only the number of gallons or the year is appropriate, based on the incorrect equation.
[2] The correct equation is shown, but the number of gallons and the year are not determined or are determined incorrectly.
or [2] The incorrect equation $y = 6.2x + 12{,}451.2$ is shown, but appropriate work is shown for the number of gallons and the year.
[1] An incorrect equation is shown with a negative slope, and the number of gallons and the year are not determined.
or [1] 20.2 thousand and 2008, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[8]

[6] $p = 8.1875t + 72.7860$, 1993, and 220.2, and appropriate work is shown.
[5] Appropriate work is shown, but one computational or rounding error is made.
or [5] The expression $8.1875t + 72.7860$ is written and 1993 and 220.2 are found, and appropriate work is shown.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
or [4] A correct equation is written, but either the year or the predicted value for 2008 is not found, but appropriate work is shown.
or [4] An incorrect equation is solved appropriately.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] $p = 8.1875t + 72.7860$, 1993, and 220.2, but no work is shown.
or [3] The expression $8.1875t + 72.7860$ is written and either 1993 or 220.2 is found, and appropriate work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] A correct equation is written, but no further correct work is shown.
or [2] 1993 and 220.2, but no work is shown.
[1] The expression $8.1875t + 72.7860$ is written, but no further correct work is shown.
or [1] 1993 or 220.2, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[9]

[6] $\overline{W} = 44.6$ and $\overline{L} = 43.2$, the line of best-fit equation ($y = -1.007559x + 88.137149$) is shown, and an appropriate justification of point $(\overline{W}, \overline{L})$ fitting or not fitting, depending on the rounding of the equation, is given.
[5] $\overline{W}$ or $\overline{L}$ is incorrect, but the rest of the work is appropriate.
or [5] All conditions of the problem are met, except it is not stated whether $(\overline{W}, \overline{L})$ lies or does not lie on the line of best fit.
or [5] $\overline{W}$ and $\overline{L}$ and the equation of the line of best fit are correct, but one error results in an incorrect conclusion, such as the calculation or interchanging of $\overline{W}$ and $\overline{L}$.
[4] Both $\overline{W}$ and $\overline{L}$ are incorrect, but the rest of the work is appropriate.
or [4] $\overline{W}$ and $\overline{L}$ are correct, but the equation of the line of best fit is incorrect, but the justification is appropriate, based on the incorrect equation.
or [4] $\overline{W}$ and $\overline{L}$ are correct, a correct scatter plot is drawn, a correct line of best fit is drawn, $(\overline{W}, \overline{L})$ is plotted correctly, and a statement indicating that the point does or does not fit the line is given, with an appropriate explanation, but no equation is used.
or [4] All conditions of the problem are met, except for the justification of whether $(\overline{W}, \overline{L})$ lies on the line.
[3] $\overline{W}$ and $\overline{L}$ are correct, but the equation of the line of best fit is stated incorrectly, and no further work is shown.
[2] Only $\overline{W}$ and $\overline{L}$ are found correctly.
[1] Only one mean is found correctly.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[10]

[4] $\bar{x} = 80$, $\bar{y} = 20.8$, and $y = 0.25x + 0.8$, and appropriate work is shown to prove that ($\bar{x}$, $\bar{y}$) is a point on the line of regression.
[3] Appropriate work is shown, but one computational error is made.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
[1] $\bar{x} = 80$, $\bar{y} = 20.8$, and $y = 0.25x + 0.8$, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[11]

[6] A correct scatter plot, $y = 0.62x + 29.18$, $r = 0.92$, and 83; and appropriate work is shown.
[5] Appropriate work is shown, but one computational or rounding error is made.
or [5] A correct scatter plot, equation, and score are shown, but no *r*-value is found.
[4] A correct scatter plot and equation are shown, but the *r*-value and score are missing or incorrect.
or [4] An incorrect equation is shown, but all further work is appropriate.
or [4] The scatter plot is missing or incorrect, but all further work is appropriate.
[3] The scatter plot is incorrect, but a correct equation and either a correct *r*-value or score are found.
or [3] The scatter plot is correct, but an incorrect equation and either an appropriate *r*-value or score based on the incorrect equation are found.
[2] Only a correct scatter plot is shown, and all further work is missing or incorrect.
or [2] Only a correct equation is shown, and all further work is missing or incorrect.
[1] An incorrect equation is shown, but an appropriate score is found.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[12]