A.REI.D.11: Other Systems 3

1 The path of a rocket is represented by the equation $y = \sqrt{25 - x^2}$. The path of a missile designed to intersect the path of the rocket is represented by the equation $x = \frac{3}{2}\sqrt{y}$. The value of x at the point of intersection is 3. What is the corresponding value of y?
1) -2
2) 2
3) -4
4) 4

2 The graphs of the equations $y = 2^x$ and $y = -2x + a$ intersect in Quadrant I for which values of a?
1) $0 < a < 1$
2) $a < 1$
3) $a \geq 1$
4) $a > 1$

3 The flight paths of two Thunderbird jets are plotted on a Cartesian coordinate plane, and the equations of the jets' flight paths are represented by $y = 2^x + 3$ and $y = 0.5^x$. The best approximation of the intersection of the flight paths is
1) $(-1.72, 3.3)$
2) $(0, 1)$
3) $(-1.50, 2.82)$
4) $(-2, -1)$

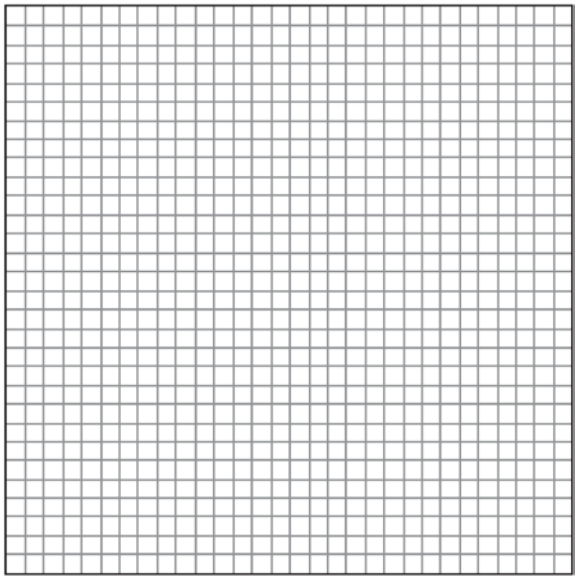
4 What is the total number of points of intersection of the graphs of the equations $xy = 12$ and $y = -x^2 + 3$?
1) 1
2) 2
3) 3
4) 4

5 Solve the system of equations algebraically for x and y: $\frac{y}{x} = \frac{x-3}{2}$
$y + 2 = x$

6 Determine algebraically the x-coordinate of all points where the graphs of $xy = 10$ and $y = x + 3$ intersect.

7 A landscape architect's designs for a town park call for two parabolic-shaped walkways. When the park is mapped on a Cartesian coordinate plane, the pathways intersect at two points. If the equations of the curves of the walkways are $y = 11x^2 + 23x + 210$ and $y = -19x^2 - 7x + 390$, determine the coordinates of the two points of intersection. [Only an algebraic solution can receive full credit.]

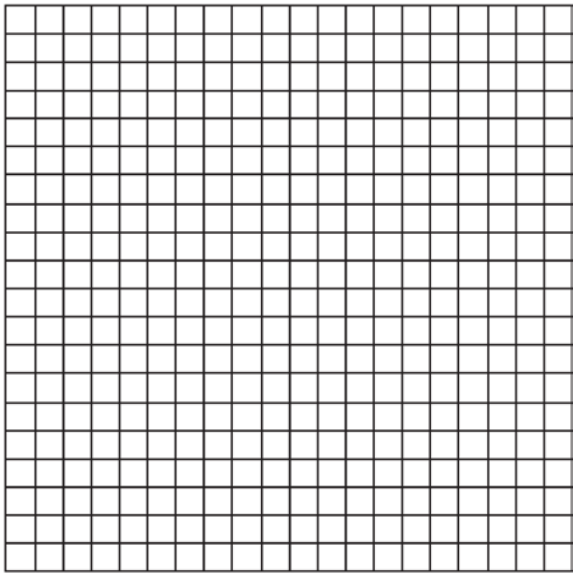
8 On the accompanying grid, sketch the graphs of $y = 2^x$ and $3y = 7x + 3$ over the interval $-3 \le x \le 4$. Identify and state the coordinates of all points of intersection.



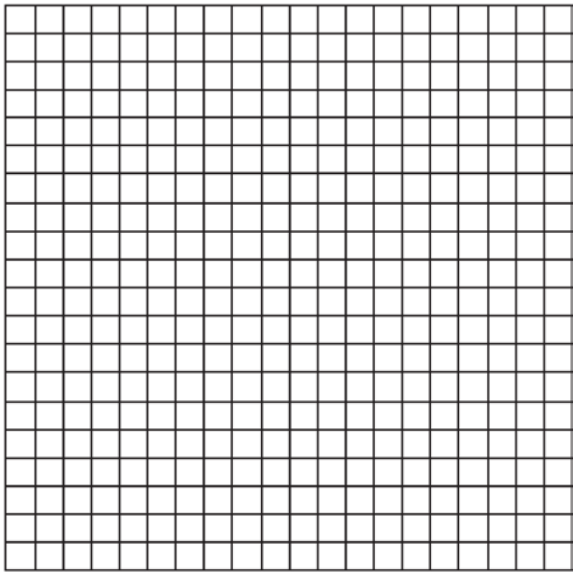
9 On the accompanying grid, solve the following system of equations graphically:

$$y = -x^2 + 2x + 1$$

$$y = 2^x$$



10 A pair of figure skaters graphed part of their routine on a grid. The male skater's path is represented by the equation $m(x) = 3\sin\frac{1}{2}x$, and the female skater's path is represented by the equation $f(x) = -2\cos x$. On the accompanying grid, sketch both paths and state how many times the paths of the skaters intersect between $x = 0$ and $x = 4\pi$.



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Answer Section

1 ANS: 4

$y = \sqrt{25 - x^2} = \sqrt{25 - 3^2} = 4.$

$x = \frac{3}{2}\sqrt{y}$

$3 = \frac{3}{2}\sqrt{y}$

$2 = \sqrt{y}$

$y = 4$

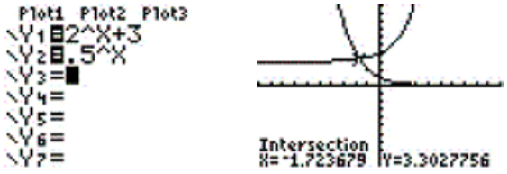
REF: 060205b

2 ANS: 4

The function $y = -2x + a$ passes through Quadrant I only if $a > 0$. The function $y = 2^x$ intersects the *y*-axis at $x = 1$, and continues through Quadrant I with a positive slope. If $a = 1$, the graphs of the equations intersect at (0,1), which is not in Quadrant I. Therefore, $a > 1$.

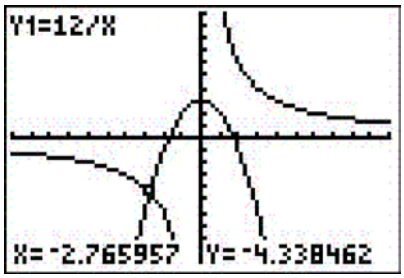
REF: 060519b

3 ANS: 1



REF: 080705b

4 ANS: 1



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5 ANS:

$$\frac{x-2}{x} = \frac{x-3}{2} \qquad y = 4-2 = 2 \quad (4,2),(1,-1)$$

$$x^2 - 3x = 2x - 4 \qquad y = 1-2 = -1$$

$$x^2 - 5x + 4 = 0$$

$$(x-4)(x-1) = 0$$

$$x = 4, 1$$

REF: 011737a2

6 ANS:

$$x(x+3) = 10$$

$$x^2 + 3x - 10 = 0$$

$$(x+5)(x-2) = 0$$

$$x = -5, 2$$

REF: 011431a2

7 ANS:

$$11x^2 + 23x + 210 = -19x^2 - 7x + 390$$

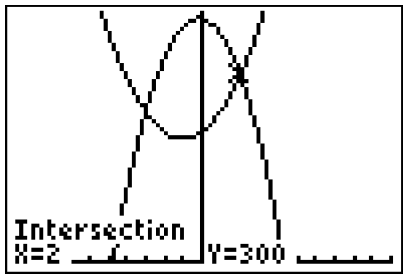
$$30x^2 + 30x - 180 = 0$$

$(2,300),(-3,240).$ $\quad x^2 + x - 6 = 0 \quad$ $y = 11(-3)^2 + 23(-3) + 210 = 240.$

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

$$x = -3 \; x = 2$$

$y = 11(2)^2 + 23(2) + 210 = 300.$



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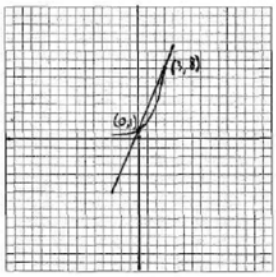
8 ANS:



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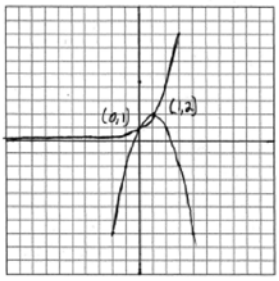
9 ANS:



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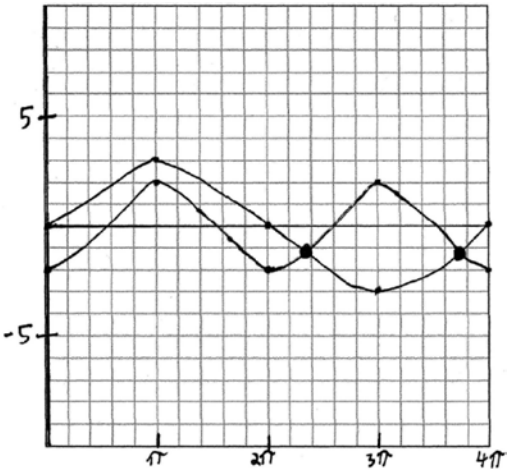
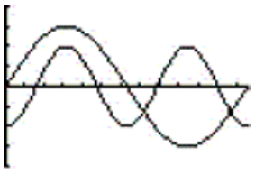
10 ANS:



two times.



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