

Name: Solution

Date: \_\_\_\_\_

**Pre Calculus 11: HW Section 8.1 Solving Systems of Equations by Graphing**

1. Find the slope and y-intercept for each of the following linear function:

<p>a) <math>y = -3x + 17</math></p> <p>Slope: <u>-3</u> Y-intercept: <u>17</u></p>	<p>b) <math>y = \frac{24-3x}{2}</math></p> <p><math>y = -\frac{3x}{2} + \frac{24}{2}</math></p> <p>Slope: <u><math>-\frac{3}{2}</math></u> Y-intercept: <u>12</u></p>	<p>c) <math>4x + 3y = 12</math></p> <p><math>3y = -4x + 12</math></p> <p><math>y = -\frac{4x}{3} + 4</math></p> <p>Slope: <u><math>-\frac{4}{3}</math></u> Y-intercept: <u>4</u></p>
<p>d) <math>-5x + 8y - 20 = 0</math></p> <p><math>8y = 5x + 20</math></p> <p><math>y = \frac{5x}{8} + \frac{20}{8}</math></p> <p>Slope: <u><math>\frac{5}{8}</math></u> Y-intercept: <u><math>\frac{5}{2}</math></u></p>	<p>e) <math>\frac{2}{3}x - \frac{4}{5}y = 12</math></p> <p><math>\frac{2x}{3} - 12 = \frac{4y}{5}</math></p> <p><math>\frac{2x}{3} - 60 = 4y</math></p> <p><math>y = \frac{5x}{6} - 15</math></p> <p>Slope: <u><math>\frac{5}{6}</math></u> Y-intercept: <u>-15</u></p>	<p>f) <math>y = 8x^2 + 5</math></p> <p><u>NOT A LINEAR FUNCTION!</u></p> <p>Slope: <u>N/A</u> Y-intercept: <u>5</u></p>

2. Find the vertex, "X" intercepts, and "Y" intercepts for each of the following quadratic functions:

<p>a) <math>y = (x-3)^2 - 7</math></p> <p><math>0 = (x-3)^2 - 7</math></p> <p><math>7 = (x-3)^2</math></p> <p><math>\pm\sqrt{7} = x-3</math></p> <p><math>3 \pm \sqrt{7} = x</math></p> <p>Vertex: <u>(3, -7)</u> Y-int: <u>(0, 2)</u> X-int: <u><math>3 \pm \sqrt{7}</math></u></p>	<p>b) <math>y = -(x+2)^2 + 8</math></p> <p><math>0 = -(x+2)^2 + 8</math></p> <p><math>-8 = -(x+2)^2</math></p> <p><math>\pm\sqrt{8} = (x+2)</math></p> <p><math>-2 \pm \sqrt{8} = x</math></p> <p>Vertex: <u>(-2, 8)</u> Y-int: <u>(0, 4)</u> X-int: <u><math>(-2 \pm \sqrt{8}, 0)</math></u></p>
<p>c) <math>y = 2(x+4)^2 - 9</math></p> <p><math>9 = 2(x+4)^2</math></p> <p><math>\pm\sqrt{\frac{9}{2}} = x+4</math></p> <p><math>4 \pm \frac{3}{\sqrt{2}} = x</math></p> <p>Vertex: <u>(-4, -9)</u> Y-int: <u>(0, 2)</u> X-int: <u><math>(4 \pm \frac{3\sqrt{2}}{2}, 0)</math></u></p>	<p>d) <math>y = x^2 + 16x + 73</math></p> <p><math>-57 = (x+4)^2</math></p> <p><u>CAN'T SQ. ROOT</u></p> <p>Vertex: <u>(-4, 57)</u> Y-int: <u>(0, 73)</u> X-int: <u>NONE!</u></p>
<p>e) <math>y = -2x^2 + 8x + 20</math></p> <p><math>26 = (x+4)^2</math></p> <p><math>\pm\sqrt{26} = x+4</math></p> <p><math>-4 \pm \sqrt{26} = x</math></p> <p>Vertex: <u>(-4, 52)</u> Y-int: <u>(0, 20)</u> X-int: <u><math>(-4 \pm \sqrt{26}, 0)</math></u></p>	<p>f) <math>y = 3x^2 + 9x + 33</math></p> <p><math>y = 3(x^2 + 3x) + 33</math></p> <p><math>y = 3(x^2 + 3x + 2.25) - 6.75 + 33</math></p> <p><math>y = 3(x + 1.5)^2 + 26.25</math></p> <p>Vertex: <u>(-1.5, 26.25)</u> Y-int: <u>(0, 33)</u> X-int: <u>NONE</u></p>

3. Graph each of the following lines with the grid provided on the right

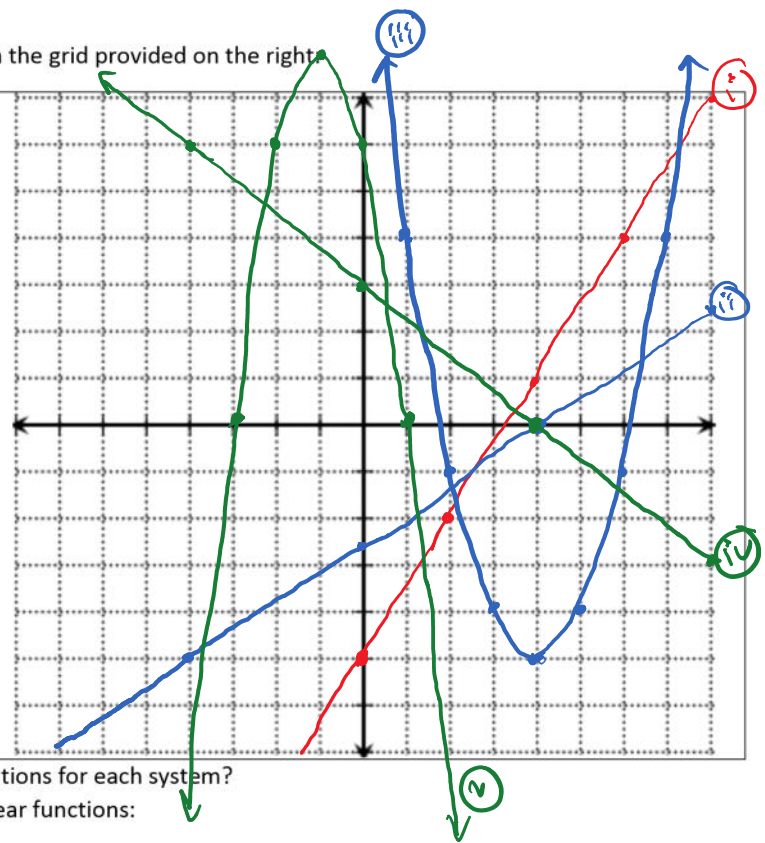
i)  $y = \frac{3}{2}x - 5$   
 $m = \frac{3}{2}$   $b = -5$

ii)  $5x - 8y = 20$  •  $y=0, x=4$   
 $5x - 20 = 8y$   $m = \frac{5}{8}$   $(4, 0)$   
 $\frac{5}{8}x - \frac{5}{2} = y$

iii)  $y = (x-4)^2 - 5$   
 $p=4$   $q=-5$   
 $v(4, -5)$   $a=1$

iv)  $12 - 4y = 3x$   
 $12 - 3x = 4y$   $m = -\frac{3}{4}$   $b = 3$   
 $3 - \frac{3x}{4} = y$

v)  $y = -2(x+1)^2 + 8$   $a = -2$   
 $p = -1$   $q = 8$   $(-1, 8)$   $(-2, 6)$



4. What is the maximum number of solutions for each system?

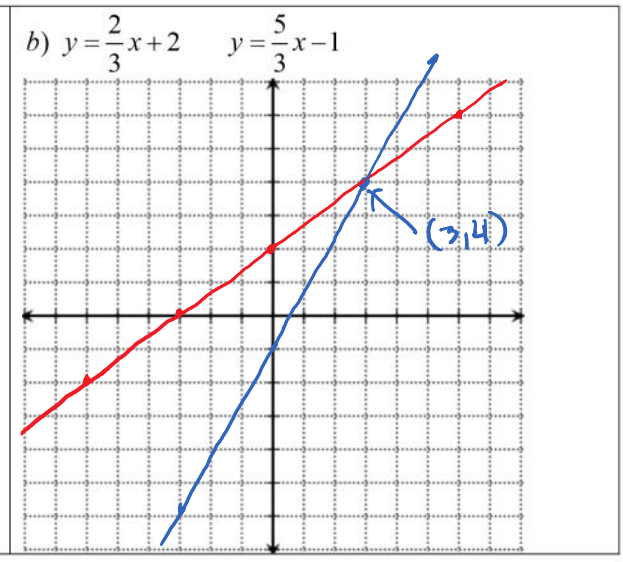
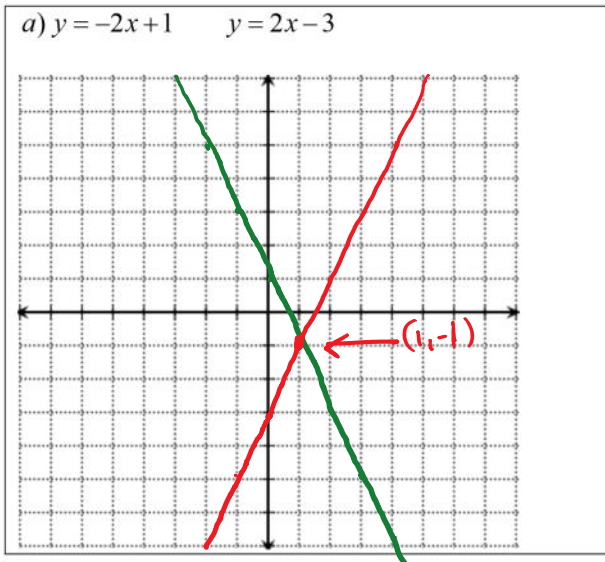
a) A system of equations with two linear functions:

**INFINITE**

b) A system of equations with two different quadratic functions:

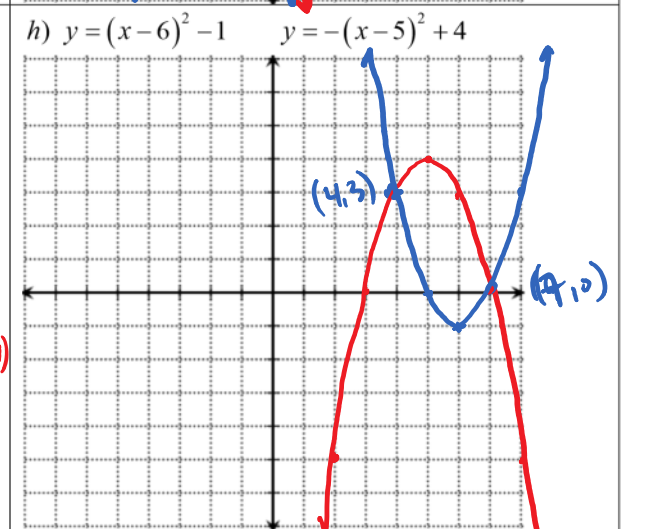
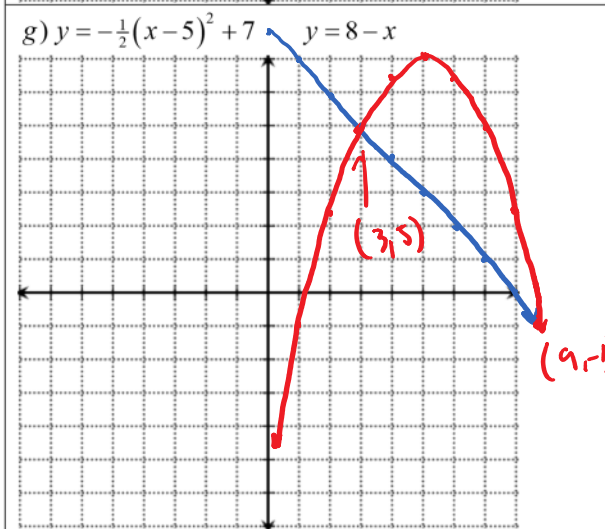
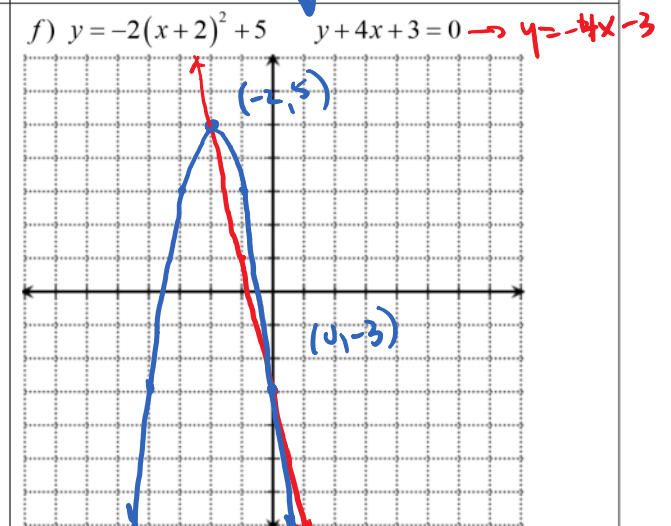
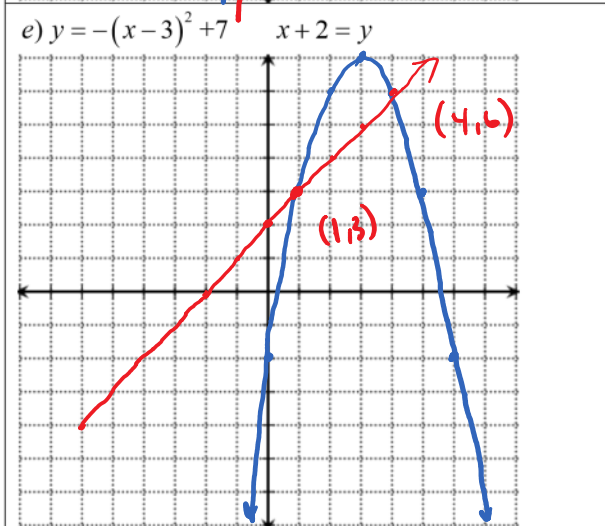
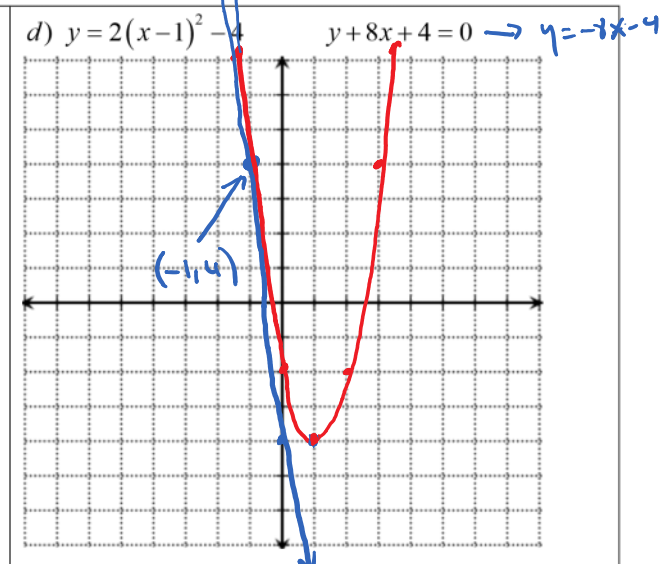
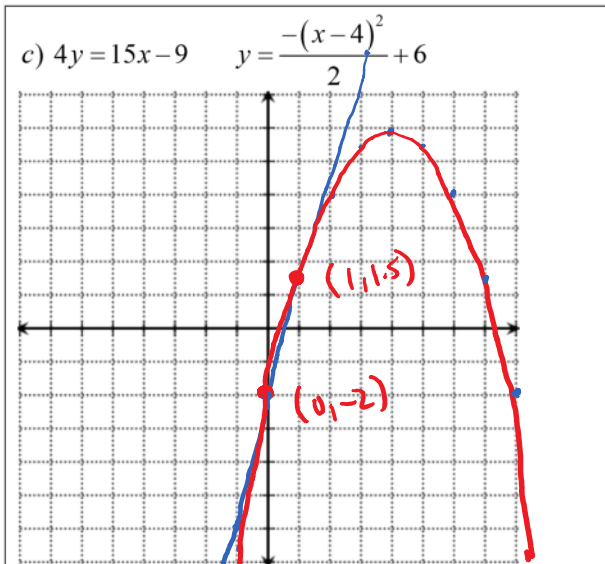
**TWO INTERSECTIONS**

5. Graph each system using the grid provided and then find points of intersections:



c)  $4y = 15x - 9$      $y = \frac{-(x-4)^2}{2} + 6$

d)  $y = 2(x-1)^2 - 4$      $y + 8x + 4 = 0 \rightarrow y = -8x - 4$



$$x=4, y=-3$$

6. The lines with equations  $px + 3y = 15$  and  $6x + qy = 30$  pass through the point  $(4, -3)$ . What is the value of  $p+q$ ?

$$4p + 3(-3) = 15$$

$$6(4) + q(-3) = 30$$

$$4p - 9 = 15$$

$$24 - 3q = 30$$

$$4p = 24$$

$$-3q = 6$$

$$p = 6$$

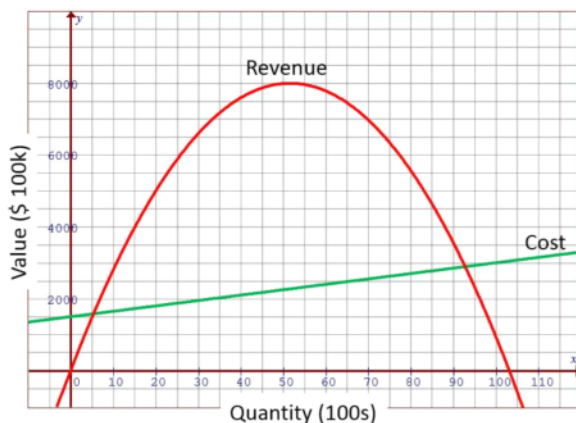
$$q = -2$$

$$\therefore p+q = 6+(-2) = 4$$

7. What does it mean when a line is tangent to a parabola?

It touches the parabola at only one point.

8. The following graph shows the revenue and cost for producing and selling a certain number of high end watches in a company. Profit is defined as: Profit = Revenue - Cost. Use the graph to answer the following questions: Cost  $y = 15x + 1500$ , Revenue:  $y = -3(x - 51.5)^2 + 8000$



- a) What are the solutions to this system? What do the solution represent?

The points of intersections is where the revenue is equal to the cost of production. At these points the profit is zero.

- b) Using this graph, what quantity will generate the maximum profit?

The max. profit is near the vertex.

- c) What would happen to the company financially if they produced over 100,000 watches?

They would lose a lot of money.