Pre-Calculus 11 **Chapter 9 Review** **Period: _____**

Name: _____ Date: _____

1. Solve the following inequalities.

a) $x^2 - 2x - 8 \geq 0$

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

$(x+2)(x-4) = 0$

$x = -2 \text{ or } x = 4$

Solution : $x \leq -2 \text{ or } x \geq 4$

b) $x(x-5) < 14$

$x^2 - 5x - 14 = 0$

$(x+2)(x-7) = 0$

$x = -2 \text{ or } x = 7$

Solution : $-2 < x < 7$

c) $15 - x^2 \geq 2x$

$x^2 + 2x - 15 \leq 0$

$x^2 + 2x - 15 = 0$

$(x+5)(x-3) = 0$

$x = -5 \text{ or } x = 3$

Solution : $-5 < x < 3$

d) $-2x - 2x^2 > 15 - 15x$

$-2x^2 + 13x - 15 > 0$

$2x^2 - 13x + 15 < 0$

$(2x-3)(x-5) = 0$

$x = \frac{3}{2} \text{ or } x = 5$

Solution : $\frac{3}{2} < x < 5$

e) $(2x-3)^2 \geq 3x+1$

$4x^2 - 12x + 9 \geq 3x + 1$

$4x^2 - 15x + 8 = 0$

$x = \frac{15 \pm \sqrt{(-15)^2 - 4(4)(8)}}{2(4)}$

$x = 0.644 \text{ or } x = 3.106$

Solution : $x \leq 0.644 \text{ or } x \geq 3.106$

f) $5x^2 + 3x - 18 > (x+1)(2x-3)$

$5x^2 + 3x - 18 > 2x^2 - x - 3$

$3x^2 + 4x - 15 > 0$

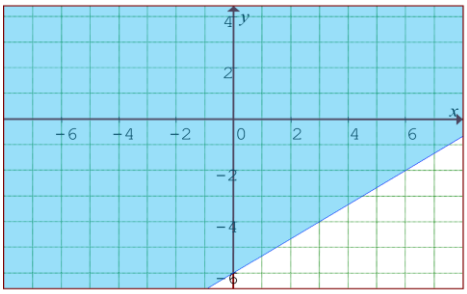
$(3x-5)(x+3) = 0$

$x = \frac{5}{3} \text{ or } x = -3$

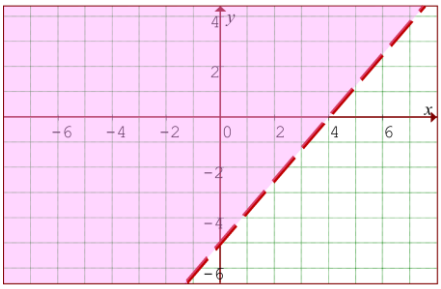
Solution : $x < -3 \text{ or } x > \frac{5}{3}$

2. Graph the following inequalities.

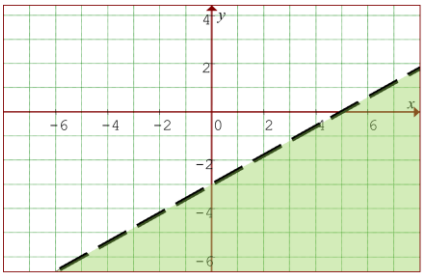
a) $y \geq \frac{2}{3}x - 6$



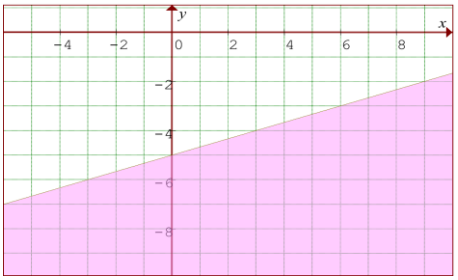
b) $5x - 4y < 20$



c) $0.4x - \frac{2}{3}y > 2$

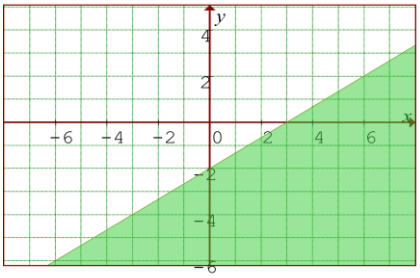


d) $\frac{1}{5}x - \frac{3}{5}y \geq 3$



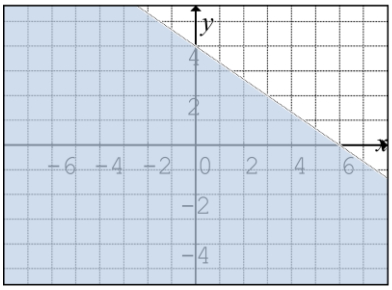
3. Write an inequality to describe each graph.

a)



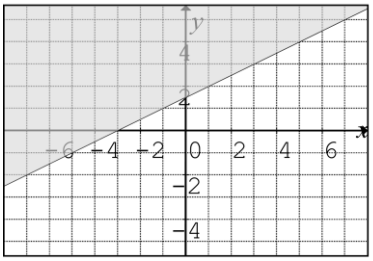
$2x - 3y \geq 6$

b)



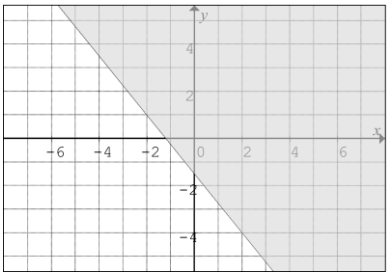
$2x + 3y \geq 12$

c)



$x - 2y \leq -3$

d)

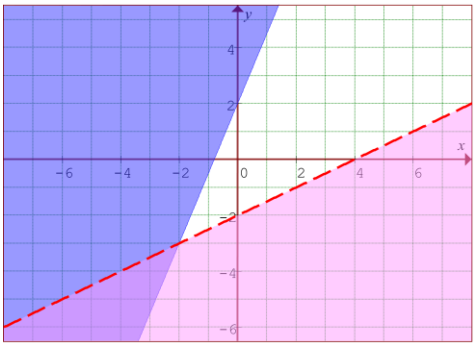


$y - 1 \geq -\frac{5}{4}(x + 2)$

4. Graph the following inequalities.

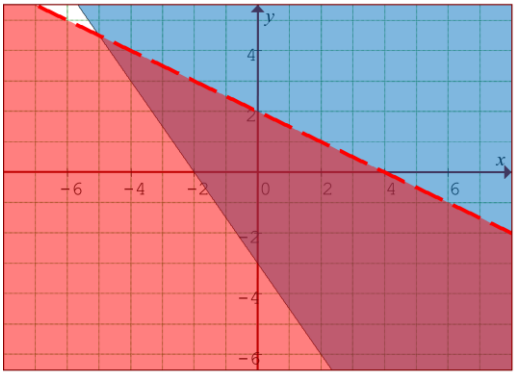
a) $y \geq \frac{5}{2}x + 2$

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



b) $3x + 2y \geq -6$

$x + 2y < 4$

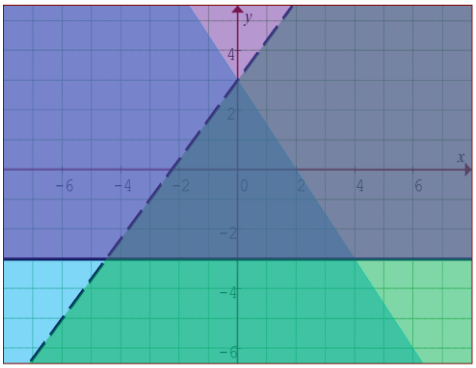


c) $3x + 2y \leq 6$

$4x - 3y > -9$

$y \geq -3$

(Calculate the area of the enclosed region)



$A = \frac{b \times h}{2}$

$A = \frac{8.5 \times 6}{2}$

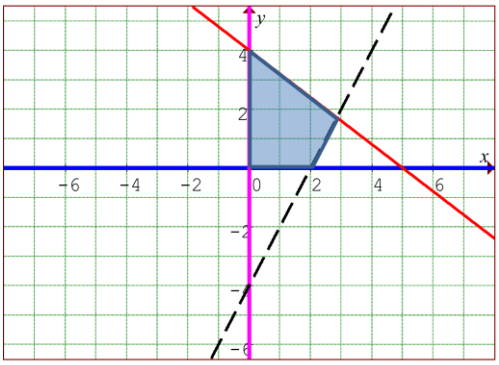
$A = 25.5$

d) $4x + 5y \leq 20$

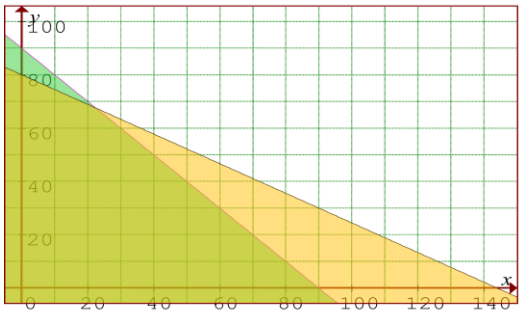
$2x - y < 4$

$x > 0$

$y \geq 0$



5. Jonny Orchard has 90 hectares of land to produce apples and peaches. It costs him \$250 per hectares to plant x hectares of apples, and \$450 per hectares to plant y hectares of peaches. If no more than \$36 000 is available for planting, Write a system of inequalities to describe the situation and draw a graph to show up to how much Jonny can spend.

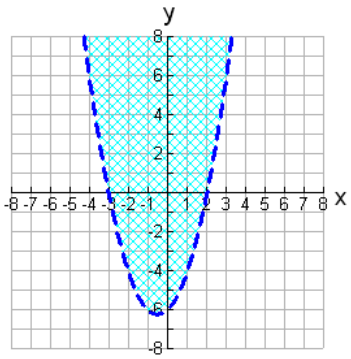


$x + y \le 90$

$250x + 450y \le 36000$

6. Write an inequality to describe each graph.

a)



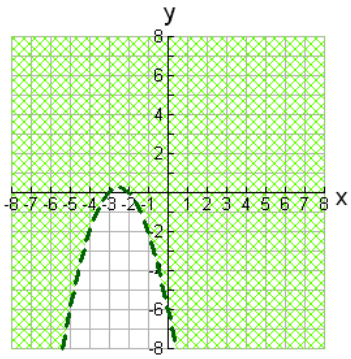
$y < a(x+3)(x-2)$

$-5 = a(0+3)(0-2)$

$\frac{5}{6} = a$

$y < \frac{5}{6}(x+3)(x-2)$

b)



$y > a(x+3)(x+2)$

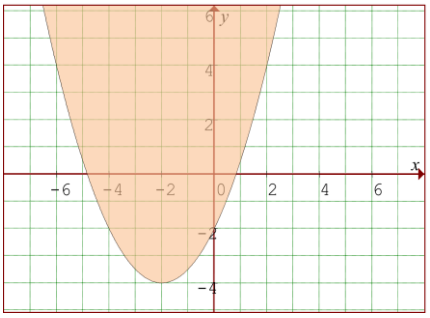
$-6 = a(0+3)(0+2)$

$-1 = a$

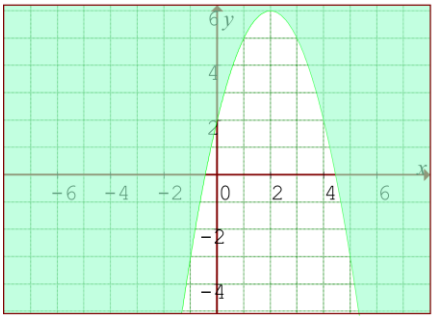
$y > -(x+3)(x+2)$

7. Graph the following inequalities.

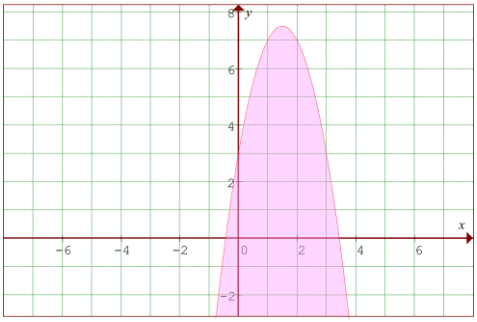
a) $y \geq \frac{1}{2}(x+2)^2 - 4$



b) $y \geq -x^2 + 4x + 2$

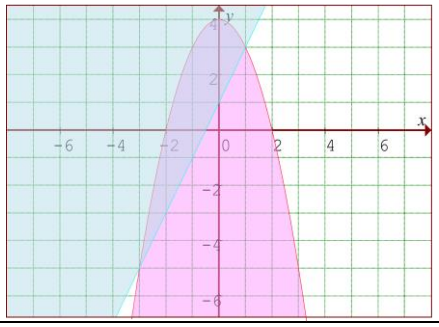


c) $y \leq -2x^2 + 6x + 3$



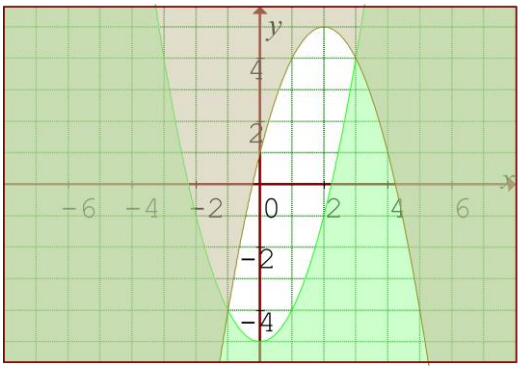
d) $y \leq 4 - x^2$

$y \geq 2x + 1$



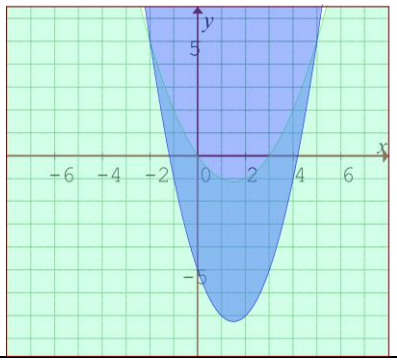
e) $y < x^2 - 5$

$y \geq -x^2 + 4x + 1$



f) $y \geq x^2 - 3x - 4$

$y < \frac{1}{2}x^2 - \frac{3}{2}x$



8. Chang's bike shop builds bikes for his customers. His profit margin is determined by the equation $P(x) = -0.2x^2 + 10.8x - 121.6$, where x is the number of bikes he has to sell. How many bikes does he have to sell in order to make a profit?

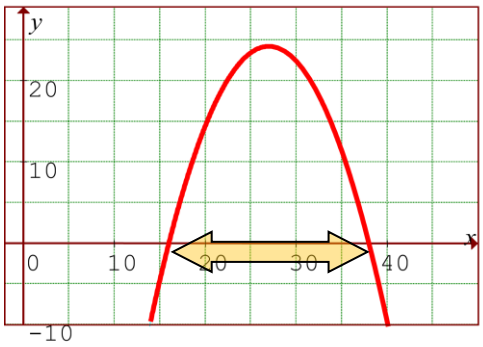
$$0 = -0.2x^2 + 10.8x - 121.6$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-10.8 \pm \sqrt{10.8^2 - 4(-0.2)(-121.6)}}{2(-0.2)}$$

$$x = \frac{-10.8 \pm \sqrt{19.36}}{-0.4} = 16 \text{ or } 38$$

Solution : $16 < x < 38$



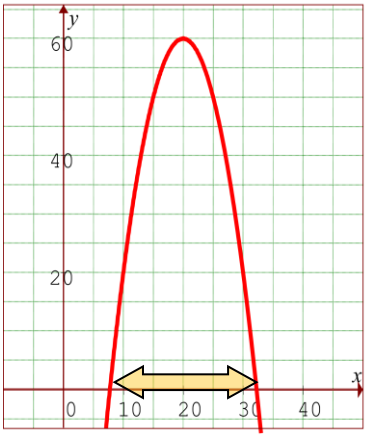
9. The price, p, in dollars of a product is given by $p(n) = 36 - 0.4n$, $0 \le n \le 90$, where n is the number of units sold each day. The operating cost of the business is \$100 per day, plus \$20 in commission for each item sold.
   a. Find the daily revenue function.
   b. Find the daily operating cost function.
   c. If the daily profit function is given by $P(n) = R(n) - C(n)$, for what values of n will the profit be made?

a)

$$R(n) = p(n) \times n$$
$$R = (36 - 0.4n) \times n$$
$$R = 36n - 0.4n^2$$

b) $C(n) = 100 + 20n$

c)
$$P(n) = 36n - 0.4n^2 - (100 + 20n)$$
$$P(n) = -0.4n^2 + 16n - 100$$



$$n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$n = \frac{-16 \pm \sqrt{16^2 - 4(-0.4)(-100)}}{2(-0.4)}$$

$$n = 7.75 \text{ or } 32.25$$

Solution : $7.75 < n < 32.25$