

Pre-Calculus 11: Unit 2 - Chapter 4 Review

1. Two numbers have a difference of 20. The sum of their squares is a minimum. Determine the numbers.

See Notes: [4.7]

$$\begin{cases} x + y = 20 \Rightarrow y = x - 20 \\ x^2 + y^2 = \text{Min} \end{cases}$$

$$\text{Vertex: } (10, 200)$$

$x \nearrow$ \nwarrow Minimum Value

$$f(x) = x^2 + y^2$$

$$f(x) = x^2 + (x - 20)^2$$

$$f(x) = 2x^2 - 40x + 400$$

$$f(x) = 2(x^2 - 20x + (10)^2 - (10)^2) + 400$$

$$f(x) = 2(x - 10)^2 + 200$$

∴ The minimum value is 200

The two numbers are:
10 and -10

2. Every week, a restaurant sells approximately 300 pizzas for \$2.50 each. Through market research, the restaurant manager determines that for every \$0.10 increase in price, they will sell 20 less pizzas. What is the price of a pizza that will maximize the revenue and what is the maximum revenue?

See Notes: [4.7]

$$f(x) = (\text{Pizza}) (\text{Price})$$

$$f(x) = (300 - 20x)(2.50 + 0.10x)$$

$$f(x) = 750 + 30x - 50x - 2x^2$$

$$f(x) = -2x^2 - 20x + 750$$

$$f(x) = -2(x + 5)^2 + 800$$

∴ The maximum Revenue is \$800

The Price = $2.50 + 0.10x$
 $= 2.50 + 0.1(-5)$
 $= \$2.00$

$$\text{Vertex: } (-5, 800)$$

$x \nearrow$ \nwarrow Max

3. The graph of a quadratic function passes through $A(-5, 8)$, and the x -intercepts of the function are -2 and 9 . What is the equation of the graph in general form? *See Notes: [4.6]*

$$y = a(x+2)(x-9)$$

$$y = \frac{4}{21}(x+2)(x-9)$$

use Point $(-5, 8)$

$$y = \frac{4}{21}(x^2 - 7x - 18)$$

$$8 = a(-5+2)(-5-9)$$

$$8 = 42a$$

$$a = \frac{4}{21}$$

$$y = \frac{4}{21}x^2 - \frac{4}{3}x - \frac{24}{7}$$

$$y = \frac{4}{21}(x+2)(x-9)$$

4. The graph of a quadratic function passes through points $A(2, 5)$ and $B(-4, -1)$. The axis of symmetry is $x = 1$. What is the equation of the graph in standard form? *See Notes: [4.6]*

$$y = a(x-p)^2 + q$$

$$y = a(x-1)^2 + q$$

Point A:

$$5 = a(2-1)^2 + q$$

$$5 = a + q$$

$$q = 5 - a \quad \textcircled{1}$$

Point B

$$-1 = a(-4-1)^2 + q$$

$$-1 = 25a + q \quad \textcircled{2}$$

Put $\textcircled{1}$ into $\textcircled{2}$

$$-1 = 25a + 5 - a$$

$$-6 = 24a$$

$$a = -\frac{1}{4}$$

$$q = 5 - (-\frac{1}{4})$$

$$q = 2\frac{1}{4}$$

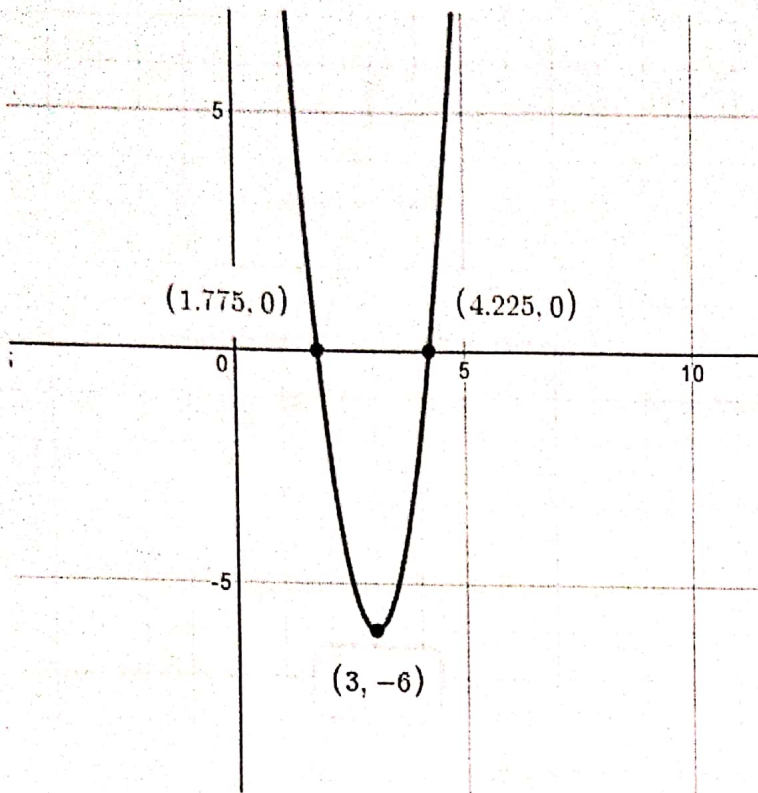
$$y = -\frac{1}{4}(x-1)^2 + \frac{21}{4}$$

Name: _____

Pre-Calculus 11 [4.1 – 4.7]

Block: _____

5. Graph the following equation $y = 4x^2 - 24x + 30$. Identify the vertex, intercepts, equation of A.O.S, domain and range
See Notes: [4.5]



Vertex: $(3, -6)$

Axis of Symmetry: $x = 3$

Intercepts:

X - Intercepts: $\left(\frac{6+\sqrt{6}}{2}, 0\right)$ and $\left(\frac{6-\sqrt{6}}{2}, 0\right)$

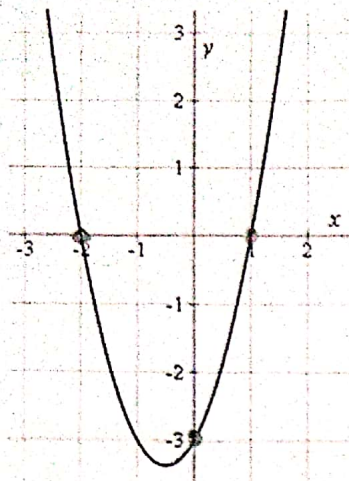
Y - Intercept: $(0, 30)$

Domain: $x \in R$

Range: $y \geq -6, y \in R$

6. Write the equation of the following graph:

See Notes: [4.4]



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

use Point (0, -3)

$$-3 = a(-1)(2)$$

$$-3 = -2a$$

$$a = 3/2$$

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

7. Describe the transformations applied to $y = x^2$

See Notes: [4.3]

a. $y = \frac{1}{2}(x-3)^2 + 4$

Vertical Shift: 4 units up
Horizontal Shift: 3 units Right

Vertical Compression by a factor of $\frac{1}{2}$

b. $y = -\frac{1}{5}(x+7)^2 - 3$

Vertical Shift 3 units down
Horizontal Shift 7 units left

Vertical Compression by a factor of $\frac{1}{5}$ downward

c. $y = 4(x-6)^2 + 1$

Vertical Shift 1 unit up
Horizontal Shift 6 units right

Vertical Stretch by factor of 4

8. List 3 ways to find the equation of axis of symmetry.

① Vertex $(P, q) \rightarrow$ A.O.S: $x = P$

② A.O.S: $x = \frac{x_1 + x_2}{2}$

③ look for x of vertex on graph**Textbook Review: Pages 330 - 335****Practice Test: Pages 336 - 338**