PC11 Ch 4 Hand-in Partial Key no inequalities

Monday, February 13, 2023 10:06 AM

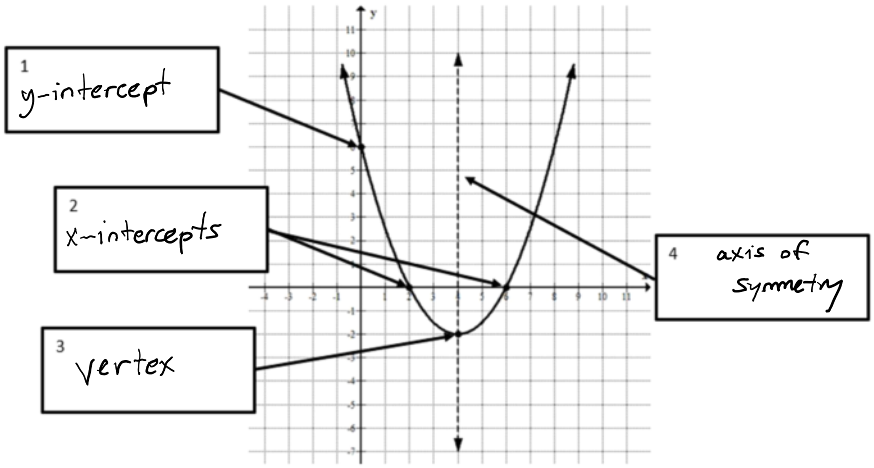
PC11 Ch 4 Hand-in 2023

PreCalc 11 Chapter 4 Assignment – hand in for completion marks

Name: Key

Complete the following questions showing all work and steps where applicable.

1a) Add the correct term to name each characteristic shown in the boxes.



b) vertex coordinates: (4, −2)

c) minimum of this function is: −2

d) axis of symmetry equation: x = 4

e) x-intercept coordinates are: (2, 0) and (6, 0)

f) y-intercept coordinates: (0, 6)

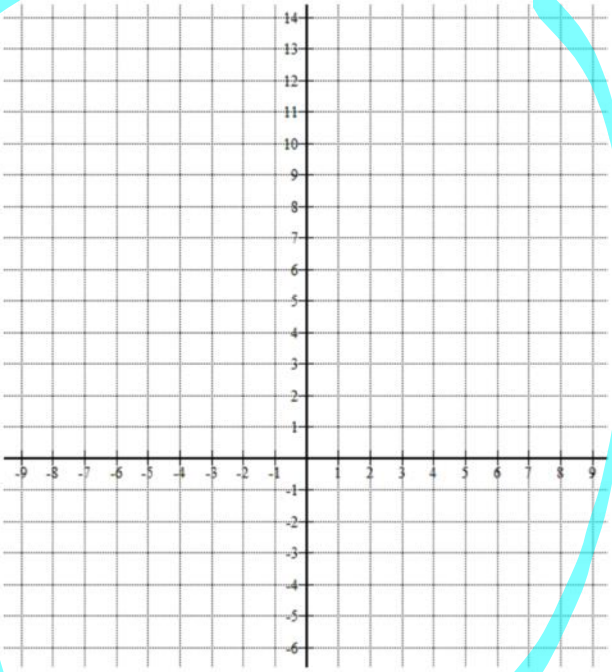
g) range: $y \geq -2$

2. Complete the table below.

Function	Direction of opening	Vertex	Axis of Symmetry Equation	Is it congruent (exact same size/shape) to $y = x^2$?
$y = x^2$	up	$(0,0)$	$x = 0$	yes
$y = 3x^2 + 5$	up	(0,5)	x = 0	no
$y = -x^2 - 9$				
$y = (x+6)^2$				
$y = 5(x-2)^2$	up	(2,0)	x = 2	no

3. **Accurately graph** each function below on the provided grid. Correctly plot 7 points for each graph.

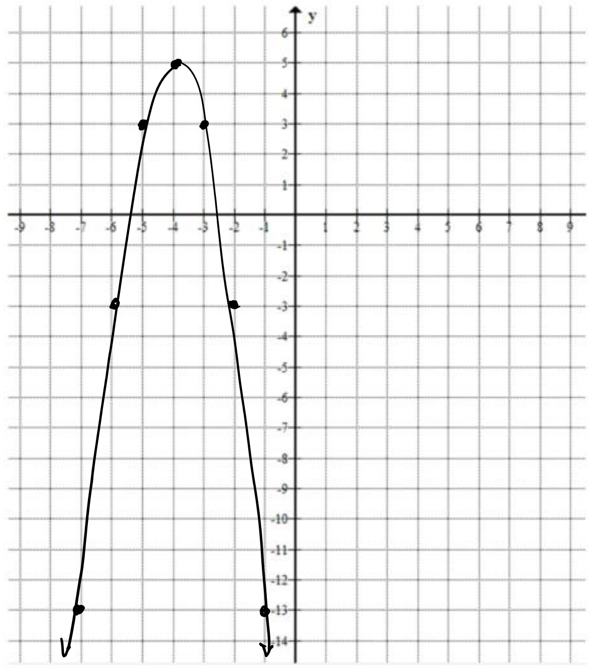
a) $y=(x-1)^2-2$



Domain:

Range:

b) $y=-2(x+4)^2+5$ $V=(-4,5)$



Domain: $x \in \mathbb{R}$

Range: $y \leq 5$

4. Use the following information, determine the equation of the quadratic function.

The vertex of the graph is at (-3, 2) and one of the x-intercepts is at (-1,0).

x ↗ ↑ y

$y = a(x+3)^2 + 2$

Substitute in $(-1,0)$

$0 = a(-1+3)^2 + 2$

$0 = a(2)^2 + 2$

$0 = 4a + 2$

$-2 \quad\quad -2$

$\frac{-2}{4} = \frac{4a}{4}$

$\frac{-2}{4} = a$, so $a = -\frac{1}{2}$

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

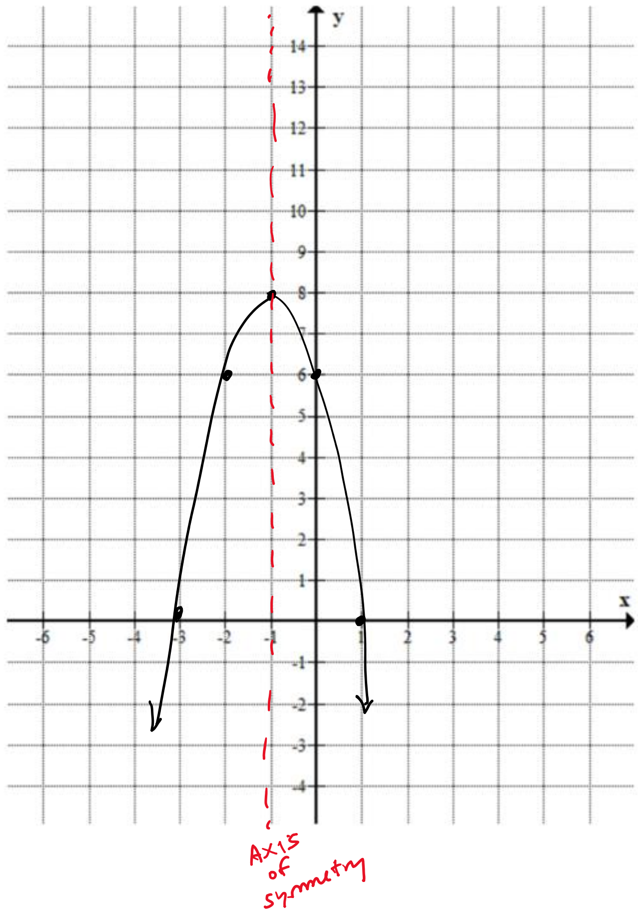
5. Give the requested characteristics of this function: $y=-2(x+1)^2+8$

a) coordinates of the vertex

$(-1, 8)$

b) direction of opening

down



c) equation of the axis of symmetry

$x = -1$

d) coordinates of the x-intercepts

Let $y=0$

$0=-2(x+1)^2+8$

$-8=-2(x+1)^2$

$\frac{-8}{-2}=\frac{-2(x+1)^2}{-2}$

$4=(x+1)^2$

$\pm\sqrt{4}=\sqrt{(x+1)^2}$

$\pm 2 = x+1$

$x+1 = 2$

$x = 2-1$

$x = 1$

$(1,0)$

$x+1 = -2$

$x = -2-1$

$x = -3$

$(-3, 0)$

e) coordinates of the y-intercept

Let $x=0$

$y=-2(0+1)^2+8$

$y=-2(1)^2+8$

$y=-2(1)+8$

$y=-2+8$

$y=6$

$(0, 6)$

f) value of the Max or Min

$max = 8$

g) domain

$x \in \mathbb{R}$

h) range

$y \leq 8$

i) For the parabola's graph, **accurately plot 5 points. Using a dotted line, graph the axis of symmetry.**

6. Convert each of the following equations to standard/vertex form by completing the square.

a) $y = x^2 - 4x + 9$ $\left(-\frac{4}{2}\right)^2 = 4$

$y = x^2 - 4x + 4 - 4 + 9$

$y = (x^2 - 4x + 4) + 5$

$\boxed{y = (x-2)^2 + 5}$

b) $y = 2x^2 - 12x + 16$

c) $y = 2x^2 - 8x + 9$ $\left(-\frac{4}{2}\right)^2 = 4$

$y = 2(x^2 - 4x + 4 - 4) + 9$

$y = 2(x^2 - 4x + 4) - 8 + 9$

$\boxed{y = 2(x-2)^2 + 1}$

7. Complete the table below.

	$y = x^2 + 6x + 8$	$y = -3x^2 + 14x + 5$
direction of opening		down
Coordinates of the y-intercept		Let $x = 0$ $y = -3(0)^2 + 14(0) + 5$ $y = 5$ $(0, 5)$
Coordinates of the x-intercepts *Hint: convert to factored form*		$y = -3x^2 + 14x + 5$ $y = -(3x^2 - 14x - 5)$ AC $= -15$, sum $= -14$: $-15, 1$ $y = -(3x^2 - 15x + 1x - 5)$ $y = -[3x(x-5) + 1(x-5)]$ $y = -[(x-5)(3x+1)]$ $x - 5 = 0$, $x = 5$; $3x + 1 = 0$, $3x = -1$, $x = -\frac{1}{3}$ $\boxed{(5, 0) \text{ and } (-\frac{1}{3}, 0)}$
equation of the axis of symmetry *Hint: you do NOT have to change to vertex form to find this*	It's halfway between the x-intercepts:	$x = \frac{5 + -\frac{1}{3}}{2}$ $x = \frac{15/3 + -1/3}{2}$ $x = \frac{14/3}{2}$ $x = 14/3 \cdot \frac{1}{2}$ $x = \frac{14}{6}$ $\boxed{x = 7/3}$

8. Every week, a take-out restaurant sells approximately 2000 chicken wraps for $1.50 each. Through market research, the restaurant manager determines that for every $0.10 increase in price, she will sell 100 fewer wraps.

Let x = the number of $0.10 increases in price

a) Create an equation that describes the revenue this restaurant will receive from selling these wraps.

b) Change the equation into vertex form by completing the square.

c) Find the price of wrap that maximizes the revenue

d) Find the maximum revenue

a) Revenue = (number sold)(price per each)

$N = 2000 - 100x$

$P = 1.50 + 0.10x$

$R = (2000 - 100x)(1.50 + 0.1x)$

$R = 3000 + 200x - 150x - 10x^2$

$R = -10x^2 + 50x + 3000$

$\left(-\frac{5}{2}\right)^2 = (-2.5)^2$
$= 6.25$

b)

$R = -10(x^2 - 5x + 6.25 - 6.25) + 3000$

$R = -10(x^2 - 5x + 6.25) + 62.5 + 3000$

$R = -10(x - 2.5)^2 + 3062.5$

c) Vertex = (2.5, 3062.5)

number of cost increases.

$\boxed{\text{Use either 2 or 3 increases.}}$

2 increases

$N = 2000 - 100(2)$
$= 1800$ sold

$P = 1.50 + 0.10(2)$
$= \$1.70$ each

Revenue $= NP$

$= 1800(1.70)$

$= \$3060$

3 increases

$N = 2000 - 100(3)$
$= 1700$ sold

$P = 1.50 + 0.10(3)$
$= \$1.80$ each

Revenue $= NP$
$= 1700(1.80)$
$= \$3060$

$\boxed{\text{maximum revenue} = \$3060}$

9. Two numbers have a difference of 22.

Let x = one of the numbers

a) Create an equation that can be used to find the minimum product.

b) Change the equation into vertex form by completing the square.

c) Find the two numbers that produce the minimum product.

d) Find the minimum product.

a) $x - y = 22$

$P = xy$

$P = x(x-22)$

$P = x^2 - 22x$

$x - y = 22$

$x - 22 = y$

$\left(\frac{22}{2}\right)^2 = 11^2 = 121$

b) $P = x^2 - 22x + 121 - 121$

$P = (x^2 - 22x + 121) - 121$

$P = (x-11)^2 - 121$

c) vertex is $(11, -121)$

this tells us $x = 11$

$y = x - 22$

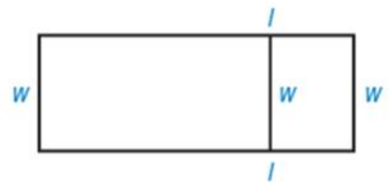
$y = 11 - 22$

$y = -11$

The other number is -11

d) The minimum product is -121

10. A rectangular area is divided into 2 rectangles with 750 m of fencing used for the perimeter and the divider, as shown in the diagram. In the diagram, *w = width* and *l = length*.



a) Create an equation that can be used to find the maximum area one can enclose with this fence.

b) Change the equation into vertex form by completing the square.

c) What values for *w* and *l* give the largest area?

d) What is that maximum area?

a) Area $= lw$

$3w + 2l = 750$

$\frac{2l}{2} = \frac{750}{2} - \frac{3w}{2}$

$l = 375 - 1.5w$

Area $= w(375 - 1.5w)$

$A = 375w - 1.5w^2$

b)

$\left(\frac{-250}{2}\right)^2 = (-125)^2 = 15625$

$A = -1.5w^2 + 375w$

$A = -1.5(w^2 - 250w + 15625 - 15625)$

$A = -1.5(w^2 - 250w + 15625) + 23437.5$

$A = -1.5(w - 125)^2 + 23437.5$

c) vertex is $(125, 23437.5)$

$\boxed{w = 125\text{ m}}$

$l = 375 - 1.5w$

$l = 375 - 1.5(125)$

$\boxed{l = 187.5\text{ m}}$

d) $\boxed{\text{Maximum area is } 23437.5\text{ m}^2}$

We are OMITTING questions #11-14. The Chapter 4 Test will not include questions like those.