

SOLUTIONS

Math 111: Quiz 4

Name _____

1. Consider the following piecewise function:

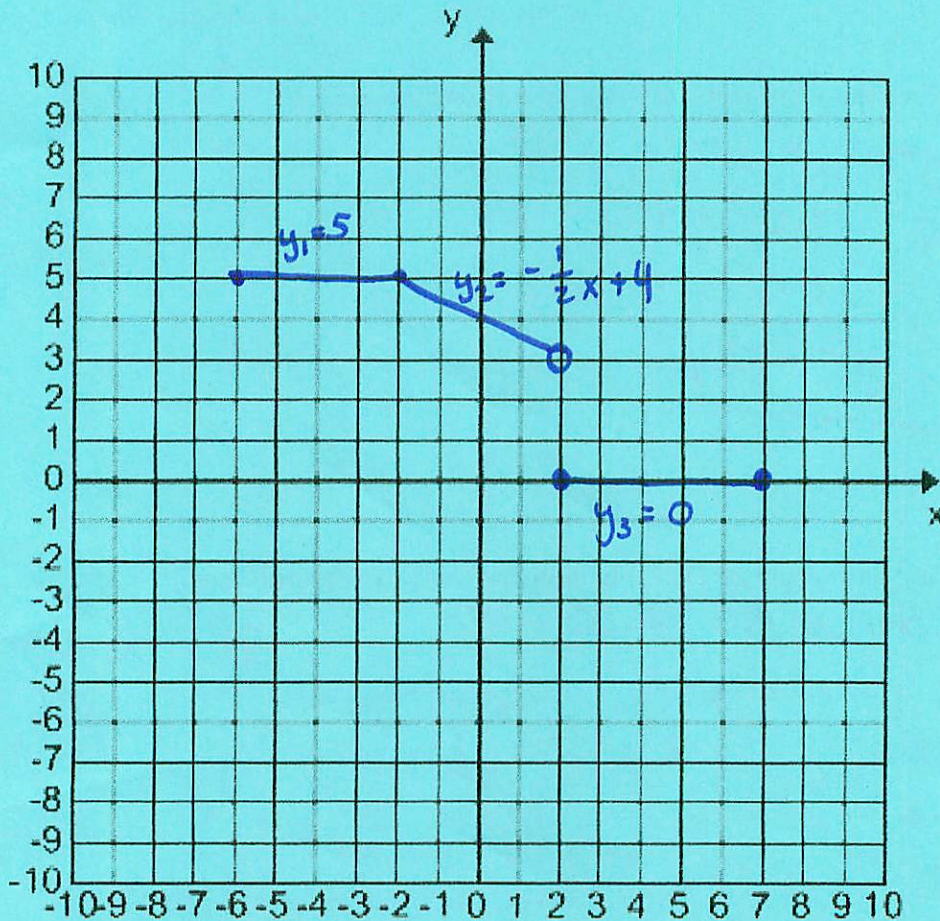
$$f(x) = \begin{cases} 5 & \text{if } -6 \leq x \leq -2 \\ -\frac{1}{2}x + 4 & \text{if } -2 < x < 2 \\ 0 & \text{if } 2 \leq x \leq 6 \end{cases}$$

a) Find $f(-3)$ and $f(2)$.

$x = -3$ $-6 \leq -3 \leq -2$: plug into top function: $f(-3) = 5$

b) Sketch a graph of $f(x)$.

$x = 2$ $2 \leq 2 \leq 6$: plug into bottom function: $f(2) = 0$



Please be sure to show all of your work. Stating "I graphed it" is not valid work.

2. Let $f(x) = x^2 + 4x - 12$.

(a) Find the x -intercepts of $f(x)$, or state why none exist.

x -int is when $y=0$.

$$0 = x^2 + 4x - 12$$

$$0 = (x-2)(x+6)$$

$x-2=0 \rightarrow x=2$
 $x+6=0 \rightarrow x=-6$

OR

$$a=1$$

$$b=4$$

$$c=-12$$

$$\frac{-4 \pm \sqrt{4^2 - 4 \cdot 1 \cdot (-12)}}{2 \cdot 1}$$

$$= \frac{-4 \pm \sqrt{16 + 48}}{2} = \frac{-4 \pm \sqrt{64}}{2} = \frac{-4 \pm 8}{2}$$

(b) Find the y -intercept of $f(x)$, or state why none exist.

y -int is when $x=0$

$$y = 0^2 + 4 \cdot 0 - 12$$

$$= 0 + 0 - 12$$

$$y = -12$$

$\frac{-4-8}{2} = \frac{-12}{2} = -6$
 $\frac{-4+8}{2} = \frac{4}{2} = 2$

(c) Find the vertex of $f(x)$. (Include both x and y coordinates.)

COMPLETING THE SQUARE

$$y = x^2 + 4x - 12$$

$$y+12 = x^2 + 4x$$

$$y+16 = x^2 + 4x + 4$$

$$y+16 = (x+2)^2$$

$$y = (x+2)^2 - 16$$

$$(-2, -16)$$

MAGIC STEP
 $(\frac{b}{2})^2 = (\frac{4}{2})^2 = 4$

OR

x -coord is the average of the x -intercepts:

$$\frac{2 + (-6)}{2} = \frac{-4}{2} = -2$$

OR x -coord is $\frac{-b}{2a} = \frac{-4}{2} = -2$

y -coord. is $f(-2) = (-2)^2 + 4(-2) - 12$

$$= 4 - 8 - 12$$

$$= -16$$

$$(-2, -16)$$