7.2b Absolute Value continued

Warm-up:

$$y = 6 - 2x$$
$$y = -2x + 6$$

1. a) Sketch the graph of the function $g(x) = |6 - 2x|$

Plot $(0,6)$

Slope is $\frac{-2}{1}$

b) Write a function in piecewise notation

$-(6 - 2x)$

$-6 + 2x$

$$y = \begin{cases} 6 - 2x, & x \leq 3 \\ 2x - 6, & x > 3 \end{cases}$$

2. If $(-4, -8.2)$ is on $y = f(x)$, where is the point on $y = |f(x)|$ ← all y-values are positive

$(-4, 8.2)$

3. If the x-int of $y = f(x)$ is 3 and the y-int is $-8/5$. What are the x- and y-ints of $y = |f(x)|$
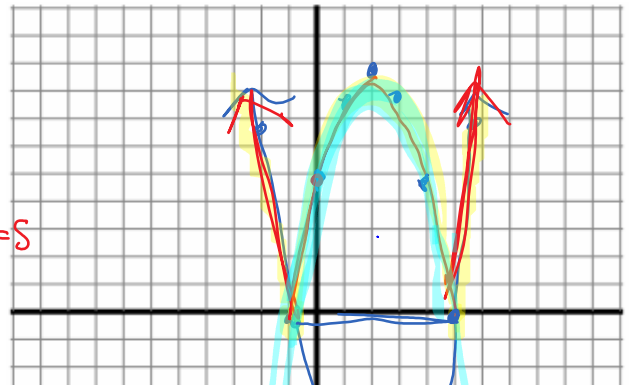
x-int: 3 ← never changes b/c $|0| = 0$

y-int: $8/5$

7.2b Quadratic Absolute Functions

Ex.1   Given $f(x) = |x^2 - 4x - 5|$ $x^2 - 4x - 5$

$(x - 5)(x + 1)$

a) Determine the x- and y-intercepts

$x = 5, -1$

x-int: $-1, 5$

y-int: 5 ← $y = |0^2 - 4(0) - 5| = |-5| = 5$

b) Sketch $y = x^2 - 4x - 5$

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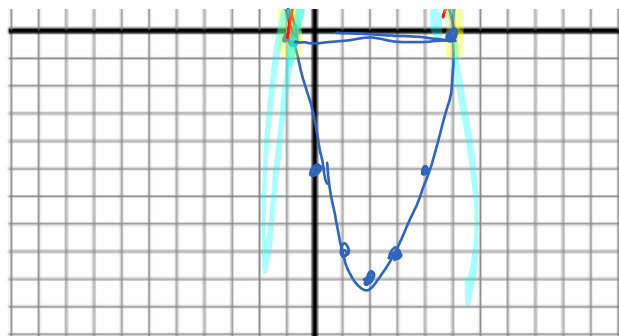
b) Sketch $y = x^2 - 4x - 5$

$1) 3$
$4) 5$
$9) 7$
16

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

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

vertex $(2, -9)$

c) Determine the domain and range

domain: all real numbers
Range: $y \geq 0$

d) Write as a piecewise function.

$$y = \begin{cases} x^2 - 4x - 5, & x \leq 1 \text{ or } x \geq 5 \\ -x^2 + 4x + 5, & -1 < x < 5 \end{cases}$$

Ex. 2   Given $f(x) = |-x^2 + 2x + 8|$

$-(x^2 - 2x - 8)$

a) Determine the x- and y-intercepts

$y = |8|$
$y = 8$

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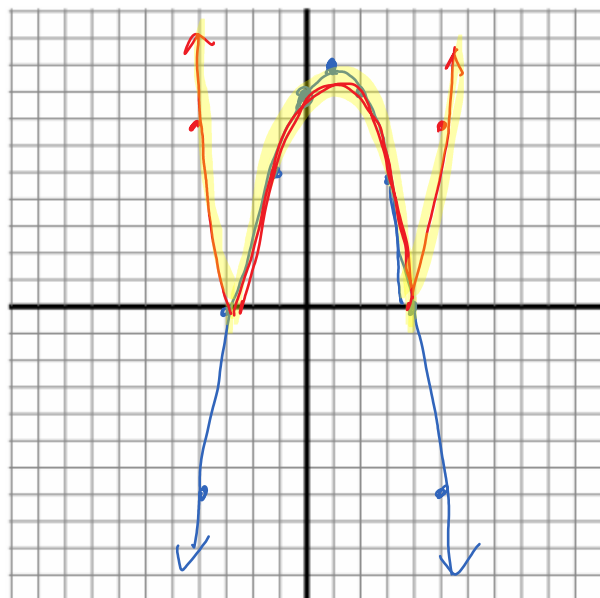$x = 4, x = -2$

b) Sketch

1
4
9
16

$y = -x^2 + 2x + 8$

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

$-1 \times 1 = -1$

$y = -(x-1)^2 + 9$

Vertex $(1, 9)$

c) Determine the domain and range

all real numbers $y \geq 0$

d) Write as a piecewise function.

$$y = \begin{cases} -x^2 + 2x + 8, & -3 \leq x \leq 4 \\ x^2 - 2x - 8, & x < -3 \text{ or } x > 4 \end{cases}$$

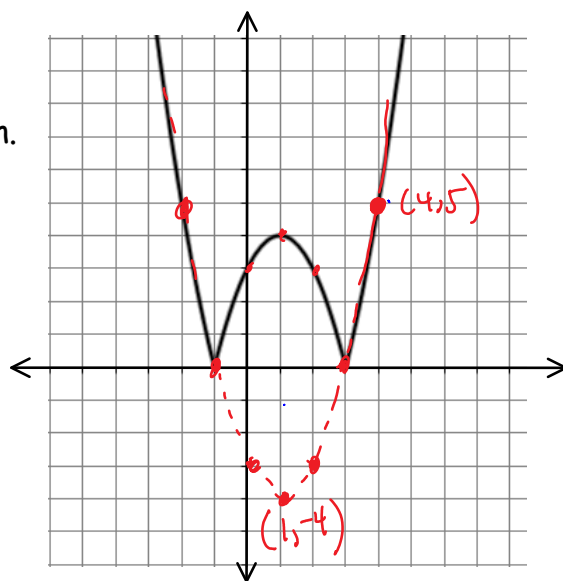Ex. 3 Given the following graph, state the equation.

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

$$y = 1(x-1)^2 - 4$$

$$y = (x-1)^2 - 4$$

$$y = (x-1)(x-1) - 4$$

$$y = x^2 - 2x + 1 - 4$$

$$y = |x^2 - 2x - 3|$$

(-4, 5)

(1, -4)

Assignment: p375 #3,4,7ab,8adef,10ac,11ac,13,22

Quiz on 7.1/7.2 next class