Absolute Value Functions (worksheet)

1. $f(x) = |x+2| - 1$

Vertex = $(-2, -1)$

a) D: $x \in \mathbb{R}$

R: $y \geq -1$

b) x-ints:

$0 = |x+2| - 1$

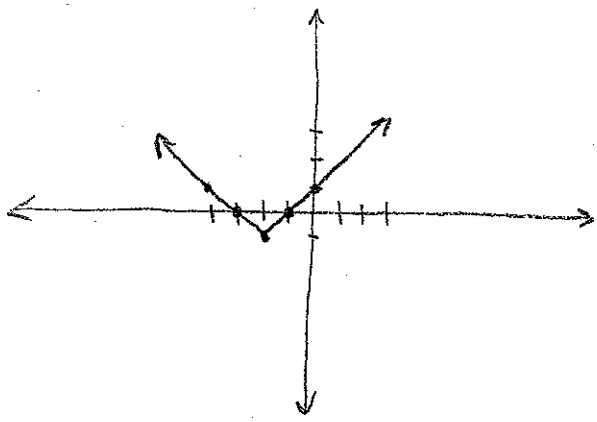
$1 = |x+2|$

$x+2 = 1$ $\quad$ $-(x+2) = 1$

$x = -1$ $\quad$ $-x - 2 = 1$

$x = -3$

$(-1, 0)$ $\quad$ $(-3, 0)$



y-int: $y = |0+2| - 1$

$y = 1$ $\quad$ $(0, 1)$

2. $f(x) = |x-4| - 3$

Vertex = $(4, -3)$

a) D: $x \in \mathbb{R}$

R: $y \geq -3$

b) x-ints:

$0 = |x-4| - 3$

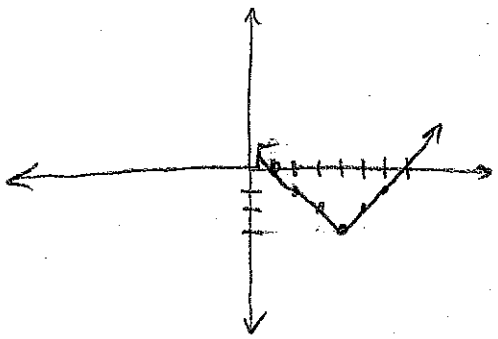
$3 = |x-4|$

$x-4 = 3$ $\quad$ $-(x-4) = 3$

$x = 7$ $\quad$ $-x + 4 = 3$

$x = 1$

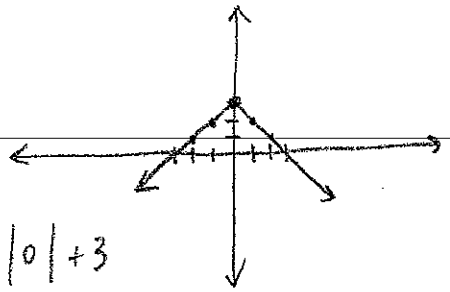
$(7, 0)$ $\quad$ $(1, 0)$



y-int: $y = |0-4| - 3$

$y = 4 - 3 = 1$ $\quad$ $(0, 1)$

3. $f(x) = -|x| + 3$ $V = (0,3)$



a) D: $x \in \mathbb{R}$

R: $y \leq 3$

b) x-ints:

$|x| = 3$

$x = 3$ $\quad -x = 3$

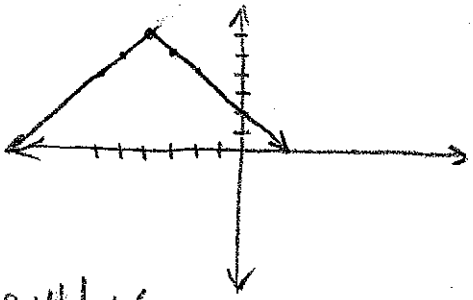
$x = -3$

$(3,0)$ $\quad (-3,0)$

y-int: $y = -|0| + 3$

$y = 3$ $\quad (0,3)$

4. $y = -|x+4| + 6$ $V = (-4,6)$



a) D: $x \in \mathbb{R}$

R: $y \leq 6$

b) x-ints:

$|x+4| = 6$

$x+4 = 6$ $\quad -(x+4) = 6$

$x = 2$ $\quad -x-4 = 6$

$x = -10$

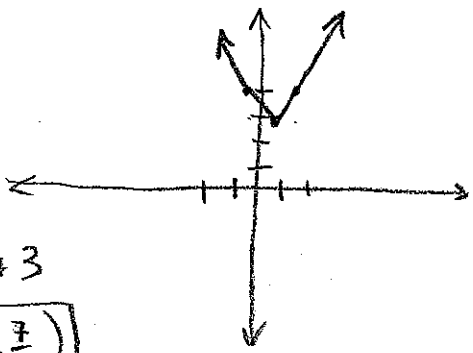
$(2,0)$ $\quad (-10,0)$

y-int:

$y = -|0+4| + 6$

$y = 2$ $\quad (0,2)$

5. $y = \left|x - \frac{1}{2}\right| + 3$ $V = \left(\frac{1}{2}, 3\right)$



a) D: $x \in \mathbb{R}$

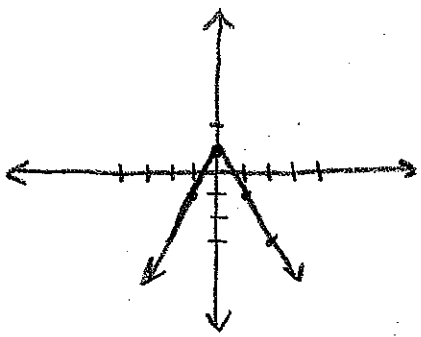
R: $y \geq 3$

b) No x-ints!

y-int: $y = \left|0 - \frac{1}{2}\right| + 3$

$y = \frac{7}{2}$ $\quad \left(0, \frac{7}{2}\right)$

6. $f(x) = -2|x| + 1$ $V = (0,1)$



a) D: $x \in \mathbb{R}$

R: $y \leq 1$

b) x-ints:

$2|x| = 1$

$|x| = \frac{1}{2}$

$x = \frac{1}{2}$ $\quad x = -\frac{1}{2}$

$\left(\frac{1}{2}, 0\right)$ $\quad \left(-\frac{1}{2}, 0\right)$

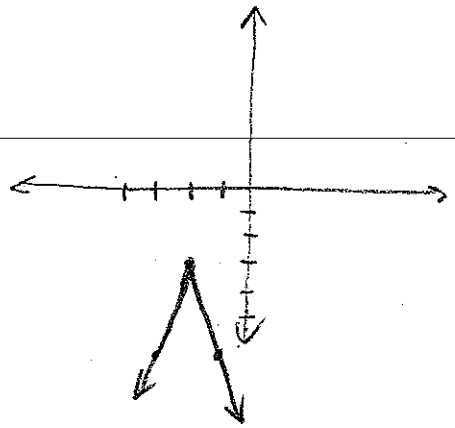
y-int: $y = -2|0| + 1$

$y = 1$ $\quad (0,1)$

7. $y = -3|x+2| - 3$ $V = (-2, -3)$

a) D: $x \in \mathbb{R}$
R: $y \leq -3$

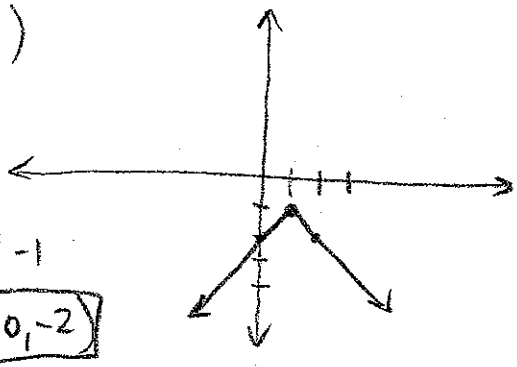
b) NO x-ints! y-int: $y = -3|0+2| - 3$
$y = -9$
$(0, -9)$



8. $f(x) = -|x-1| - 1$ $V = (1, -1)$

a) D: $x \in \mathbb{R}$
R: $y \leq -1$

b) NO x-ints! y-int: $y = -|0-1| - 1$
$y = -2$ $(0, -2)$

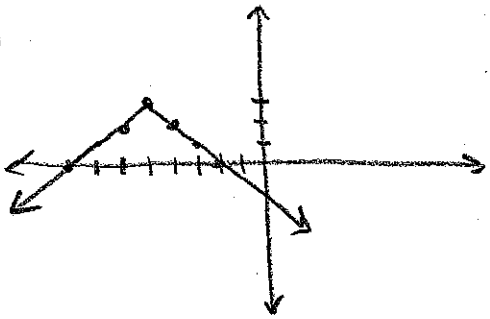


9. $f(x) = 3 - |x+5|$
$f(x) = -|x+5| + 3$ $V = (-5, 3)$

a) D: $x \in \mathbb{R}$
R: $y \leq 3$

b) x-ints:
$|x+5| = 3$

$x+5 = 3$ $-(x+5) = 3$
$x = -2$ $(-2, 0)$ $x = -8$ $(-8, 0)$



10. $y = -\frac{1}{4}|x-3| + \frac{1}{2}$ $V = (3, \frac{1}{2})$

a) D: $x \in \mathbb{R}$
R: $y \leq \frac{1}{2}$

b) x-ints:
$\frac{1}{4}|x-3| = \frac{1}{2}$
$|x-3| = 2$

$x - 3 = 2$ $-x + 3 = 2$
$x = 5$ $x = 1$
$(5, 0)$ $(1, 0)$

y-int: $y = -\frac{1}{4}|0-3| + \frac{1}{2}$
$y = -\frac{3}{4} + \frac{1}{2}$
$y = -\frac{1}{4}$ $(0, -\frac{1}{4})$