HW: pg. 72 #16-19, NOT 18b

4.3 Absolute Value Parent Graph

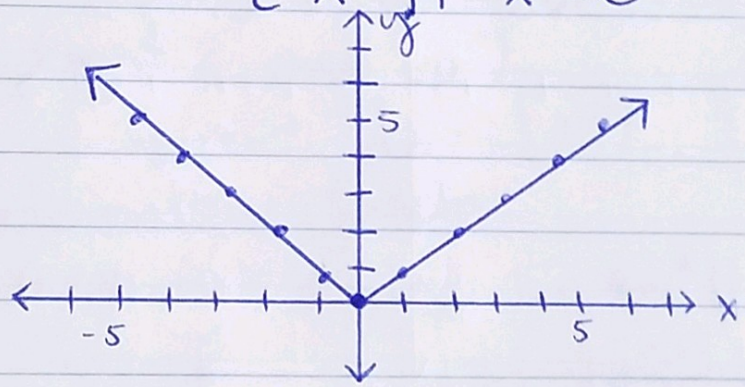
Vocabulary

Parent Function - the most basic function of that particular type; no extra numbers or operations.

Transformations - shifting, stretching, shrinking, or reflecting the graph.

Parent Graph of Absolute Value

$$f(x) = |x| = \begin{cases} -x & \text{if } x < 0 \\ x & \text{if } x \geq 0 \end{cases}$$



D: $(-\infty, \infty)$

R: $[0, \infty)$

~~Transformations~~

$$f(x) = a|x-c|+d$$

1) Graphing $y = |x| + d$ moves graph up & down
2) Graphing $y = |x-c|$ moves graph left/right
   ★ do the opposite ★
3) Graphing $y = |x-c| + d$ moves c left/right & d up/down
4) Graphing $y = a|x|$ makes graph skinnier/wider
   - negatives reflect over the x-axis
   - $a > 1$ makes graph skinnier/tighter → vertical stretch
   - $0 < a < 1$ makes graph wider → vertical shrink

Transformations: Equations

Ex #1 What are the transformations of $y = -2|x+3|-4$?

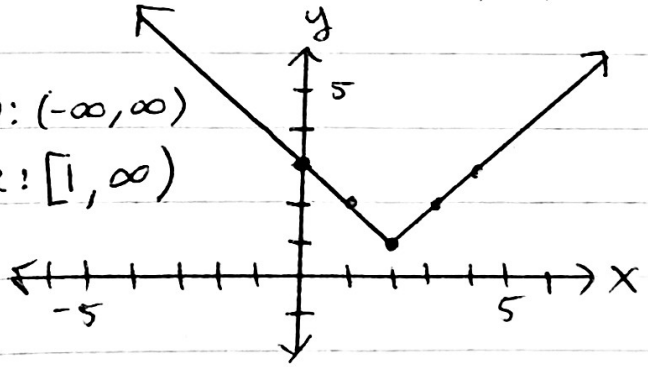
- reflects over the x-axis
- vertical stretch by a factor of 2
- left 3 units
- down 4 units

Ex #2 Write the equation if $f(x)$ is shrunk vertically by a factor of $\frac{1}{3}$, moved right 2, and up 7.

$$g(x) = \frac{1}{3}|x-2|+7$$

Transformations: Graphs

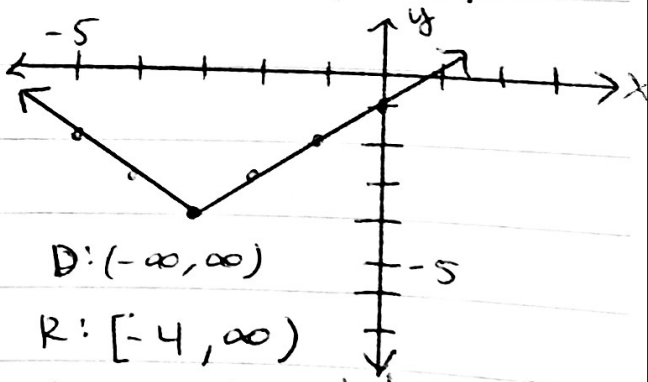
Ex #3 Graph $f(x) = |x-2|+1$ (→ 2, ↑ 1)



D: $(-\infty, \infty)$

R: $[1, \infty)$

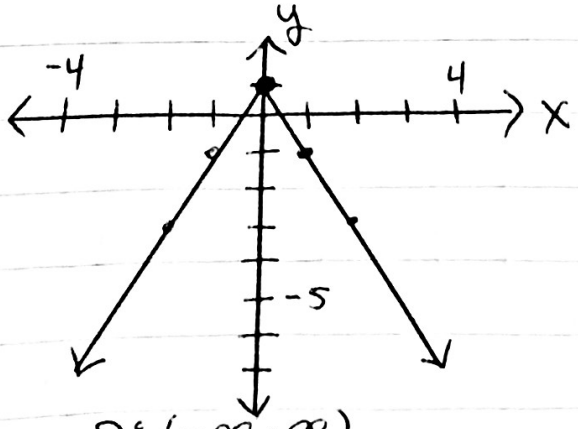
Ex #4 $f(x) = |x+3|-4$



D: $(-\infty, \infty)$

R: $[-4, \infty)$

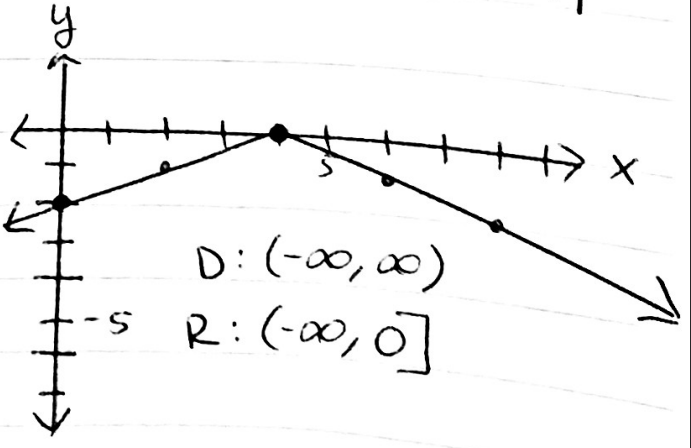
Ex #5 $f(x) = -2|x|+1$



D: $(-\infty, \infty)$

R: $(-\infty, 1]$

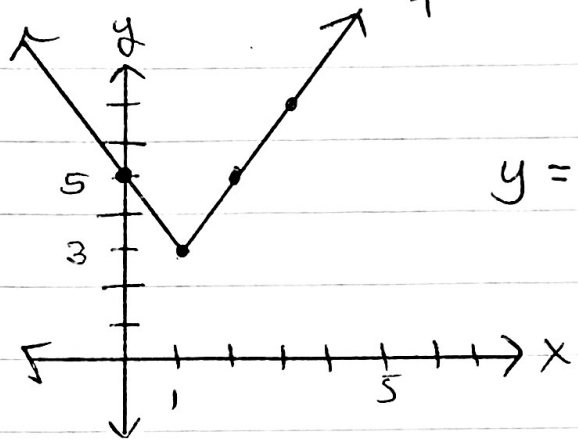
Ex #6 $f(x) = -\frac{1}{2}|x-4|$



D: $(-\infty, \infty)$

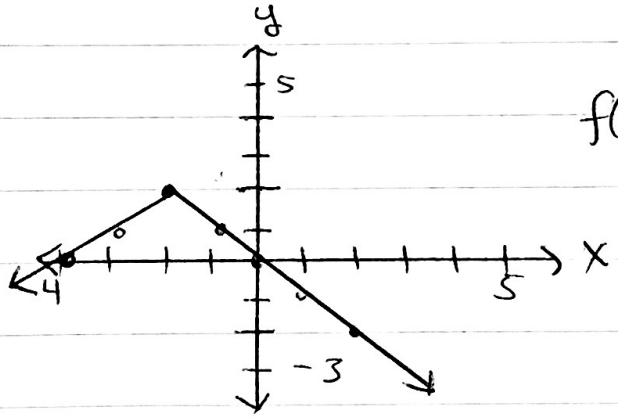
R: $(-\infty, 0]$

Ex #7 What is the equation?



$y = 2|x-1|+3$

Ex #8 What is the equation?



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