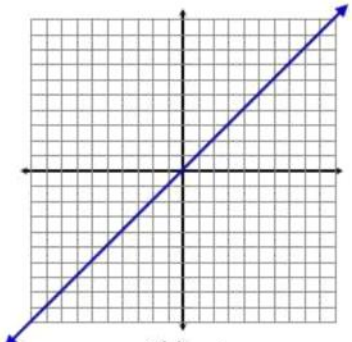
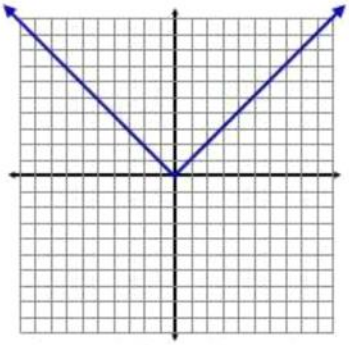
Math 1314 – College Algebra
Section 3.6 Absolute Value Functions

- Recall: The absolute value of a real number x, denoted $|x|$ is given by $|x| = \begin{cases} -x & \text{if } x < 0 \\ x & \text{if } x \geq 0 \end{cases}$

- Consider the graphs of $f(x) = x$ and $g(x) = |x|$ below.



$f(x) = x$



$g(x) = |x|$

- How can the the graph of $f(x) = x$ be used to derive the graph of $g(x) = |x|$?
Consider the y-values that are positive and 0 and keep those points (this is the x-intercept and all points of the line above the x-axis). Reflect any points where the y-value is negative across the x-axis (think: flip the "negative tail")

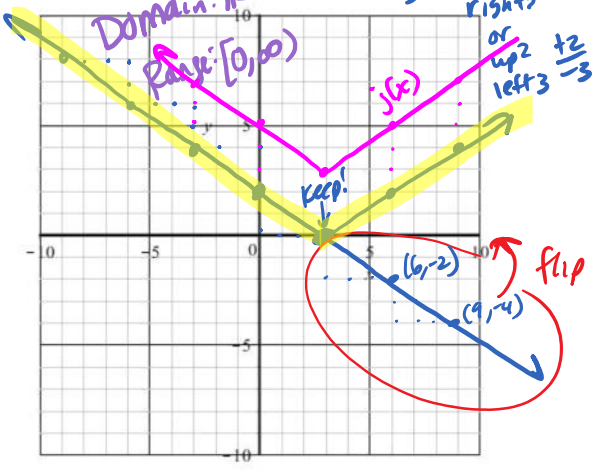
$g(x) = \left|-\frac{2}{3}x + 2\right|$

Ex: Graph $g(x) = \left|2 - \frac{2}{3}x\right|$. Give the domain and range.

$m = -\frac{2}{3}$ down 2 right 3 or up 2 left 3

① graph $y = -\frac{2}{3}x + 2$

② Flip up negative y-values (neg tail)



$j(x)$: Domain: ℝ
Range: $[3,\infty)$

Domain:
Range:

take graph of g above & move up 3

Ex: On the axes above, also graph $j(x) = \left|2 - \frac{2}{3}x\right| + 3$

Ex: Find the x-intercept(s) and y-intercept of $j(x) = \left|2 - \frac{2}{3}x\right| + 3$.

NO x-int.

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

Solve $-3 \neq \left|2 - \frac{2}{3}x\right|$

No sum abs value is + or 0

y-int: set x=0

$j(0) = |2 - 0| + 3$

$= 5$

$(0, 5)$

- Will every function have an x-intercept? No
  Will every function have an y-intercept? No