

4.6 Absolute Value Family

$$y = |x| \quad \text{parent/base function}$$

$$y = \left| \frac{x}{3} \right| \quad \text{horizontal stretch} \quad \text{or} \quad \left| \frac{1}{3}x \right|$$

$$y = \frac{2}{1}|x| \quad \text{vertical stretch}$$

$$y = 2 \left| \frac{x}{3} \right| \quad \text{both} \quad \text{slope } \frac{2}{3} \begin{matrix} \text{rise} \\ \text{run} \end{matrix}$$

$$y = -|x| \quad \text{reflection}$$

parent function $\rightarrow y = |x|$ horizontal shift *

$y = |x-h| + k$ vertical shift

stretches + shrinks $y = |x|$

$$y = a|x| \quad \begin{matrix} \text{vertical} \\ \text{stretch or} \\ \text{shrink} \end{matrix}$$

$$a > 1 \rightarrow \text{stretch}$$

$$0 < a < 1 \rightarrow \text{shrink}$$

$$y = \left| \frac{x}{b} \right| \quad \begin{matrix} \text{horizontal} \\ \text{stretch or} \\ \text{shrink} \end{matrix}$$

$$b > 1 \rightarrow \text{stretch} \quad 0 < b < 1$$

p214 1, 3, 8, 9

4.7 - Circle Family (not functions)

unit circle: with center (0,0) is $x^2 + y^2 = 1$

$$\boxed{(x-h)^2 + (y-k)^2 = r^2}$$

to graph $x^2 + y^2 = 1$ (radius = 1)

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

$y = \pm\sqrt{1-x^2}$ (graph \pm to get full circle)

ellipse - circle that has been stretched or shrunk

ex. $\left(\frac{x}{4}\right)^2 + \left(\frac{y}{3}\right)^2 = 1$

horizontal stretch 4 vertical stretch 3

always!

(an ellipse since not same number on bottom)

ex $\left(\frac{x}{2}\right)^2 + \left(\frac{y}{2}\right)^2 = 1$ (Circle same radius = 2)

ex $\left(\frac{x-3}{4}\right)^2 + \left(\frac{y-1}{3}\right)^2 = 1$ (ellipse Center switched to 3,1 x,y)

4.8 Compositions of functions

ex $f(x) = \frac{3}{4}(x-3)$ $g(x) = |x|$

find $g(f(x))$ → put the whole f equation into the g equation instead of x

so $g(f(x)) = \left| \frac{3}{4}(x-3) \right|$

ex. $f(x) = -2x+7$
 $g(x) = x^2-2$
 $h(x) = (x+1)^2$

a) $f(4)$
 $f(x) = -2x+7$
 $-2(4)+7$
 (-1)

b.) $f(g(3))$
 $g(x) = x^2-2$
 $g(3) = 3^2-2$
 (7)

then →
 $f(x) = -2x+7$
 $-2(7)+7$
 $-14+7 = (-7)$

c. $f(g(a))$
 $g(x) = x^2-2$
 $g(a) = a^2-2$
 $f(g(a)) = -2(a^2-2)+7$
 $-2a^2+4+7 = (-2a^2+11)$