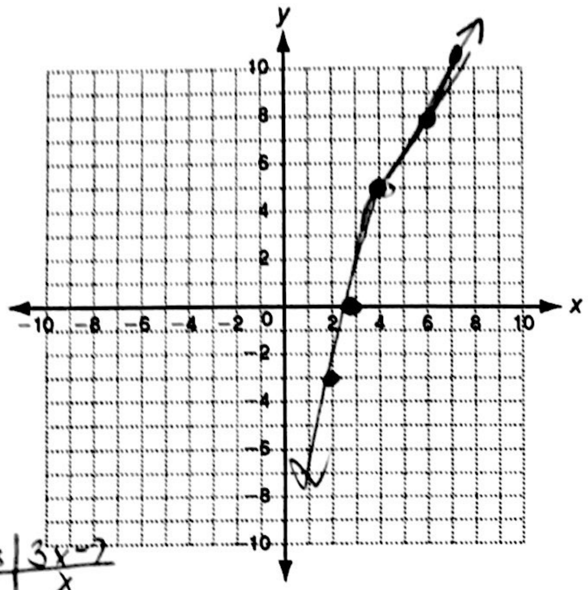
Name Key Date

Chapter 6 Test Review

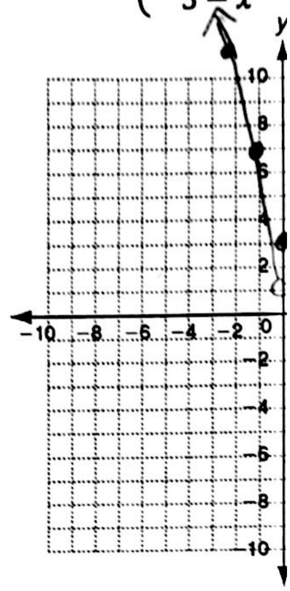
Graph each function.

1) $f(x) = \begin{cases} x^2 - 2x - 3 & if\ x \le 4 \\ 3x - 7 & if\ x > 4 \end{cases}$

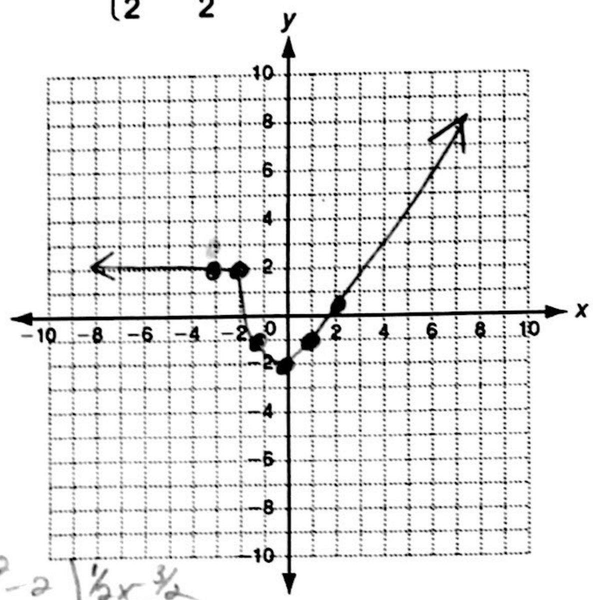


x	x^2-2x-3	$3x-7$
2	-3	X
3	0	X
4	5	5 NI
5	X	8
6	X	11

2) $f(x) = \begin{cases} 1 - 5x \\ 3 - x^3 \\ 5 - x^2 \end{cases}$

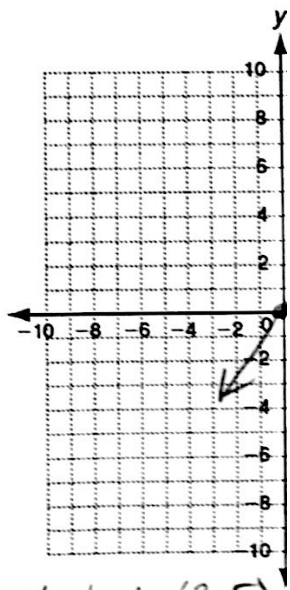


3) $f(x) = \begin{cases} 2 & \text{if } -\infty < x \le -2 \\ x^2 - 2 & \text{if } -2 < x \le 1 \\ \frac{1}{2}x - \frac{3}{2} & \text{if } 1 < x < \infty \end{cases}$



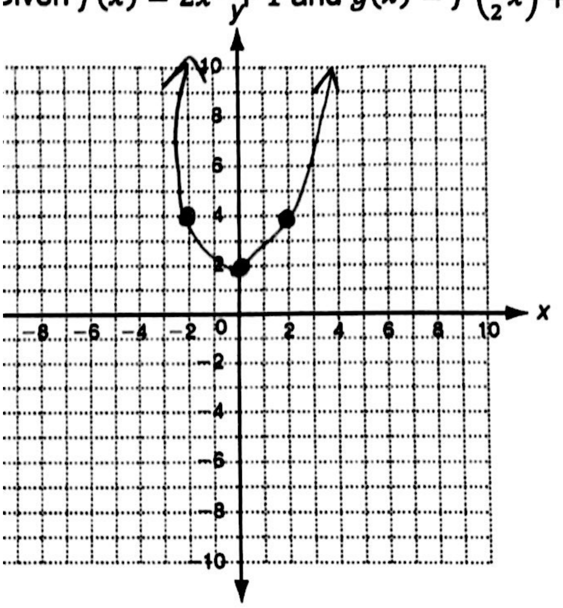
x	2	x^2-2	$\frac{1}{2}x-\frac{3}{2}$
-3	2	X	X
-2	2	2 NI	X
-1	X	-1	X
0	X	-2	X
1	X	-1	-1 NI
2	X	X	1/2

4) $f(x) = -\frac{5}{3}|x - 3| +$



Vertex: (3,5)

Given $f(x) = 2x^2 + 1$ and $g(x) = f\left(\frac{1}{2}x\right) + 1$, graph $g(x)$.



$f(x) = 2x^2 + 1$

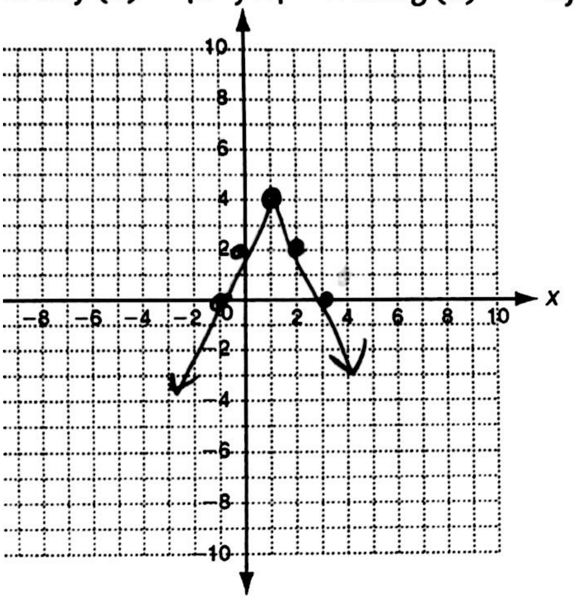
$g(x) = f(\frac{1}{2}x) + 1$

$g(x) = (2(\frac{1}{2}x)^2 + 1) + 1$

$g(x) = (2(\frac{1}{4}x^2) + 1) + 1$

$g(x) = \frac{1}{2}x^2 + 2$

Given $f(x) = |x - 2| - 2$ and $g(x) = -2f(x + 1)$, graph g(x).



$g(x) = -2(f(x+1))$

$g(x) = -2(|(x+1) - 2| - 2)$

$g(x) = -2(|x - 1| - 2)$

$g(x) = -2|x - 1| + 4$

Vertex: $(1, 4)$

Given $f(x) = \begin{cases} x^2 + 2 & if\ x < 1 \\ 4x - 1 & if\ x \geq 1 \end{cases}$, write the rule for each function.

a) $g(x)$, a vertical compression of $f(x)$ by a factor of ¼

$g(x) = \frac{1}{4}f(x)$

$g(x) = \begin{cases} \frac{1}{4}(x^2 + 2) & \text{if } x < 1 \\ \frac{1}{4}(4x - 1) & \text{if } x \geq 1 \end{cases}$

$g(x) = \begin{cases} \frac{1}{4}x^2 + \frac{1}{2} & \text{if } x < 1 \\ x - \frac{1}{4} & \text{if } x \geq 1 \end{cases}$

b) $h(x)$, a horizontal stretch by a factor of 2

$g(x) = f(\frac{1}{2}x)$

$g(x) = \begin{cases} (\frac{1}{2}x)^2 + 2 & \text{if } x < 1 \\ 4(\frac{1}{2}x) - 1 & \text{if } x \geq 1 \end{cases}$

$g(x) = \begin{cases} \frac{1}{4}x^2 + 2 & \text{if } x < 1 \\ 2x - 1 & \text{if } x \geq 1 \end{cases}$

c) $p(x)$, a horizontal translation 3 units left

$g(x) = f(x + 3)$

$g(x) = \begin{cases} (x+3)^2 + 2 & \text{if } (x+3) < 1 \\ 4(x+3) - 1 & \text{if } (x+3) \geq 1 \end{cases}$

$g(x) = \begin{cases} x^2 + 6x + 11 & \text{if } x < -2 \\ 4x + 11 & \text{if } x \geq -2 \end{cases}$

8) Consider the functions $f(x) = 2x^3 - 3x^2 - 11x + 6, g(x) = 3f(\frac{1}{2}x)$ and $h(x) = -g(\frac{1}{2}x)$.

a) Find the x- and y- intercepts of $g(x)$.

$f(x)$

x-int: $0 = 2x^3 - 3x^2 - 11x + 6$

x-int $= -3.386, 1$

y-int: $y = 2(0)^3 - 3(0)^2 - 11(0) + 6$

y-int $= 6$

$g(x) = 3f(\frac{1}{2}x)$

x int =

$(-3.386)(2) = \boxed{-6.772}$

$(1)(2) = \boxed{2}$

y int =

$(6)(3) = \boxed{18}$

b) Find the x- and y- intercepts of $h(x)$.

$g(x)$

x int =

$-6.772, 2$

y int = 18

$h(x) = -g(\frac{1}{2}x)$

x int =

$(2)(-6.772) = \boxed{-13.544}$

$(2)(2) = \boxed{4}$

y int =

$(18)(-1) = \boxed{-18}$

Given $f(x) = x^2 - 5x - 14$ and $g(x) = x - 7$, find each function.

9) $(f + g)(x)$

$f(x) + g(x) =$

$(x^2 - 5x - 14) + (x - 7)$

$(f+g)(x) = x^2 - 4x - 21$

10) $(f - g)(x)$

$f(x) - g(x)$

$(x^2 - 5x - 14) - (x - 7)$

$x^2 - 5x - 14 - x + 7$

$(f-g)(x) = x^2 - 6x - 7$

11) $(g - f)(x)$

$g(x) - f(x)$

$(x - 7) - (x^2 - 5x - 14)$

$x - 7 - x^2 + 5x + 14$

$(g-f)(x) = -x^2 + 6x + 7$

12) $(fg)(x)$

$f(x) \cdot g(x) =$

$(x^2 - 5x - 14)(x - 7)$

$x^3 - 7x^2 - 5x^2 + 35x - 14x + 98$

$(fg)(x) = x^3 - 12x^2 + 21x + 98$

13) $\left(\frac{f}{g}\right)(x)$

$\frac{f(x)}{g(x)}$

$\frac{(x^2 - 5x - 14)}{(x - 7)} = \frac{(x+2)\cancel{(x-7)}}{\cancel{(x-7)}} =$

$\left(\frac{f}{g}\right)(x) = x + 2$, where $x \neq 7$

14) $\left(\frac{g}{f}\right)(x)$

$\frac{g(x)}{f(x)}$

$\frac{(x - 7)}{(x^2 - 5x - 14)} = \frac{\cancel{(x-7)}}{(x+2)\cancel{(x-7)}} =$

$\left(\frac{g}{f}\right)(x) = \frac{1}{x+2}$, $x \neq -2$, $x \neq 7$

Let $f(x) = x - 2$ and $g(x) = \frac{8}{x+1}$.

15) Find $f(g(-2))$ and $g(f(-2))$.

$g(-2) = -8$ $\quad$ $f(-2) = -4$

$f(-8) = -10$ $\quad$ $g(-4) = -\frac{8}{3}$

$f(g(-2)) = -10$ $\quad$ $g(f(-2)) = -8/3$

16) Find $f(g(1))$ and $g(f(1))$.

$g(1) = 4$ $\quad$ $f(1) = -1$

$f(4) = 2$ $\quad$ $g(-1) =$ und

$f(g(1)) = 2$ $\quad$ $g(f(1)) =$ undefined

17) Find $g(f(x))$ and state its domain.

$g(f(x)) = \frac{8}{(x-2)+1} = \frac{8}{x-1}$

Domain: $\{x \mid x \neq 1\}$

18) Find $f(g(x))$ and state its domain.

$f(g(x)) = \left(\frac{8}{x+1}\right) - 2 = \frac{8}{x+1} - 2$

Domain: $\{x \mid x \neq -1\}$

Find the inverse of each function. Determine whether the inverse is a function, and state its domain and range.

19) $f(x) = 5 - 8x$

$y = 5 - 8x$

$x = 5 - 8y$

$x - 5 = -8y$

$\frac{x-5}{-8} = y$

$f^{-1}(x) = \frac{x-5}{-8}$

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

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

Function

20) $f(x) = \left(\frac{1}{3}x + 2\right)^2$

$y = (1/3 x + 2)^2$

$x = (1/3 y + 2)^2$

$\sqrt{x} = 1/3 y + 2$

$\sqrt{x} - 2 = 1/3 y$

$3(\sqrt{x} - 2) = y$

$3\sqrt{x} - 6 = y$

$f^{-1}(x) = 3\sqrt{x} - 6$

Domain: $[0, \infty)$

Range: $[-6, \infty)$

Not a function

21) $f(x) = \frac{5}{2x+8}$

$y = \frac{5}{2x+8}$

$x = \frac{5}{2y+8}$

$x(2y+8) = 5$

$2yx + 8x = 5$

$\frac{2yx}{2x} = \frac{5-8x}{2x}$

$y = \frac{5-8x}{2x}$

Domain: $(-\infty, 0) \cup (0, \infty)$

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

Function

21) $f(x) = 3 + \sqrt{x-5}$

$y = 3 + \sqrt{x-5}$

$x = 3 + \sqrt{y-5}$

$x - 3 = \sqrt{y-5}$

$(x-3)^2 = y - 5$

$(x-3)^2 + 5 = y$

$f^{-1}(x) = (x-3)^2 + 5$

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

Range: $[5, \infty)$

Function