FAT

LT 1 Review: Functions

Name Key

Period ____ Date ____

LT 1.1: *Find the value of a function or a composite function from its equation, graph, or table.* *Given the value of a function, work backwards to find x.* *Find the value of a composite function symbolically.*

1) Given: $f(x) = -2x + 4$ $g(x) = x^2 + 3x + 5$ $h(x) = 2x + 1$

Find each of the indicated values. Show all your work!!!!

a) *f(3)=* -2

$f(3) = -2(3) + 4$
$= -6 + 4 = -2$

b) *g(-3)=* 5

$= (-3)^2 + 3(-3) + 5$
$= 9 - 9 + 5$

c) *h(x-5)=* $2x - 9$

$= 2(x-5) + 1$
$= 2x - 10 + 1$

d) *g(x+4)=* $x^2 + 11x + 33$

$= (x+4)^2 + 3(x+4) + 5$
$= x^2 + 8x + 16 + 3x + 12 + 5$
$= x^2 + 11x + 33$

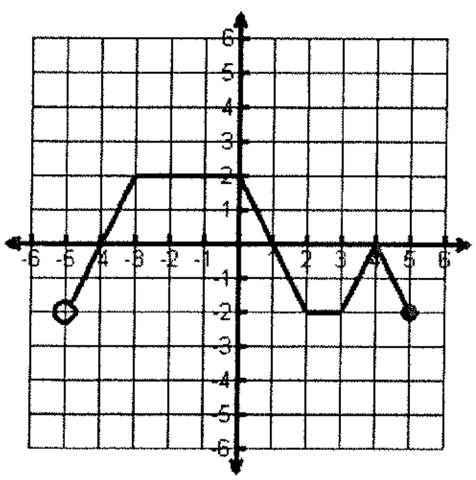
e) *f(x)= -18* find x. $x = 11$

$-2x + 4 = -18$
$-2x = -22$

f) *h(x)=15* find x. $x = 7$

$15 = 2x + 1$
$14 = 2x$

2) Given the following graph, *k(x)*



a) Find x when *k(x) = 0* $x = -4, 1, 4$

b) *k(3)=* -2

3) Given the functions defined by the tables below, find the value of the composite function.

x	-2	4	3	11
f(x)	5	-3	1	7

x	7	1	3	11
g(x)	2	8	-2	4

a) Find *f(g(11))* $= -3$

b) Find *g(f(3))* $= 8$

4) Give the functions $f(x) = 3x^2$ *and* $g(x) = 2x + 1$, find the following. Show all work!

a) $f(g(4)) =$ 243

$= 12(4)^2 + 12(4) + 3$

$= 12(16) + 48 + 3$

b. $g(f(-3)) =$ 55

$= 6(-3)^2 + 1$

$= 6(9) + 1$

c) $f(g(x)) =$ $12x^2 + 12x + 3$

$3(2x+1)^2$

$= 3(4x^2 + 2x + 2x + 1)$

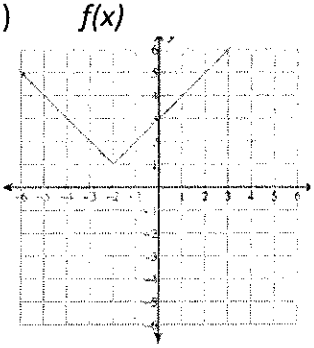
$= 12x^2 + 12x + 3$

d) $g(f(x)) =$ $6x^2 + 1$

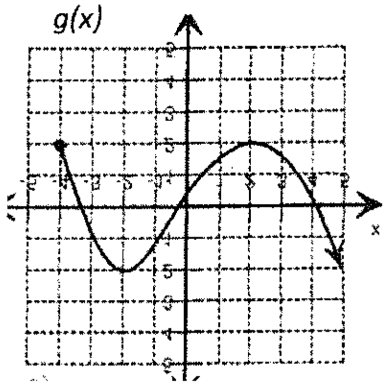
$2(3x^2) + 1$

$= 6x^2 + 1$

5) *f(x)*



g(x)



a) Find $f(g(-2)) =$ 1

b) Find $g(f(-5)) =$ 0

LT 1.2: *Find the sum, difference, product, or quotient of two or more functions.*

1) Use *f(x)* and *g(x)* to evaluate each expression. $f(x) = 3x - 6$ $g(x) = x^2 + 4$

a) $(f + g)(2) =$ 8

$x^2 + 3x - 2$

$(2)^2 + 3(2) - 2$

$4 + 6 - 2$

b) $(f - g)(-4) =$ -38

$-x^2 + 3x - 10$

$-(-4)^2 + 3(-4) - 10$

$-16 - 12 - 10$

c) $(fg)(-1) =$ -45

$3x^3 + 12x - 6x^2 - 24$

$= 3(-1)^3 - 6(-1)^2 + 12(-1) - 24$

$= 3(-1) - 6(1) - 12 - 24$

$= -3 - 6 - 12 - 24$

d) $(f/g)(1) =$ $-3/5$ or -0.60

$= \dfrac{3x-6}{x^2+4}$

$= \dfrac{3(1)-6}{(1)^2+4} = \dfrac{3-6}{1+4} = \dfrac{-3}{5}$

2) Use *f(x)* and *g(x)* to evaluate each expression. $f(x) = 3x - 6$ $g(x) = x^2 + 4$

a) $(f + g)(x) =$ x^2+3x-2

b) $(f - g)(x) =$ $-x^2+3x-10$

c) $(fg)(x) =$ $3x^3-6x^2+12x-24$

d) $(f/g)(x) =$ $\frac{3x-6}{x^2+4}$

3) Use *f(x)* and *g(x)* to evaluate each expression. $f(x) = 3x - 6$ $g(x) = x^2 + 4$

a) $(f + fg)(3) =$ 42

$3x^3-6x^2+15x-30$
$=3(3)^3-6(3)^2+15(3)-30$
$=3(27)-6(9)+45-30$
$=81-54+45-30$

b) $\left(\frac{f-g}{g}\right)(-2) =$ $-\frac{5}{2}$

$\frac{-x^2+3x-10}{x^2+4} = \frac{-(-2)^2+3(-2)-10}{(-2)^2+4} = \frac{-(4)-6-10}{4+4} = \frac{-20}{8}$

4) Use the table to evaluate each expression (if possible).

x	-2	0	2	4
f(x)	3	0	-10	-12
g(x)	4	-4	-6	-8

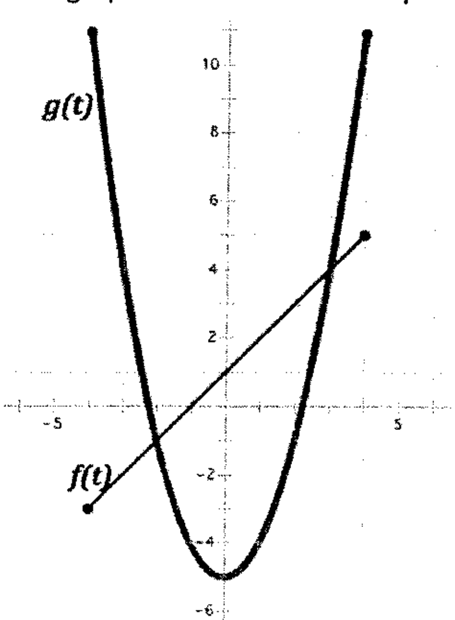
a) $(f + g)(2) =$ -16

b) $(f - g)(4) =$ -4

c) $(fg)(2) =$ 60

d) $\left(\frac{f}{g}\right)(0) =$ 0

5) Use the graph to evaluate each expression.



a) $(f + g)(2) =$ 2

$3 + -1$

b) $(f - g)(-4) =$ -14

$-3-11$

c) $(fg)(-1) =$ 0

$0 \cdot -4$

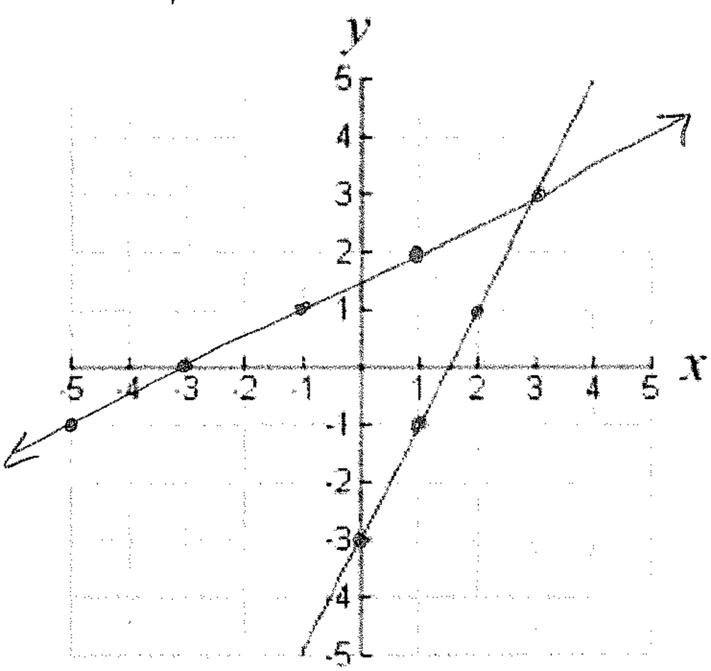
d) $(f/g)(1) =$ $-\frac{1}{2}$

$\frac{2}{4}$

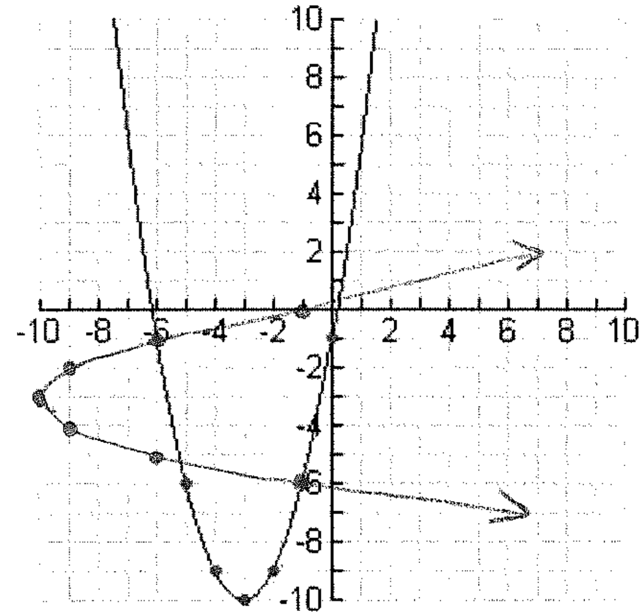
LT 1.3: *Find the inverse of functions.*

1) Graph the inverse of each function shown. Is the inverse is a function?

a) Yes

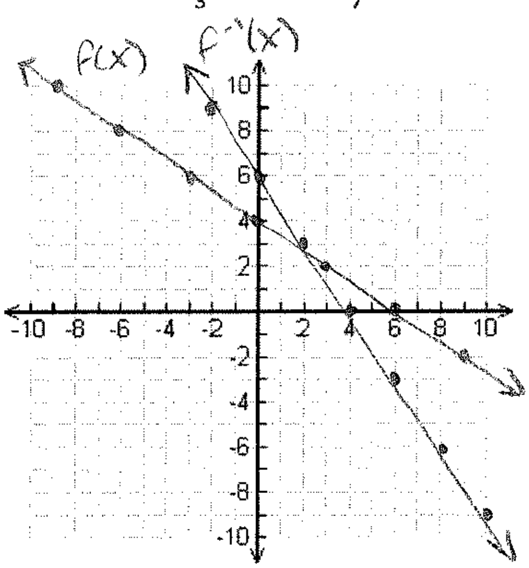


b) NO

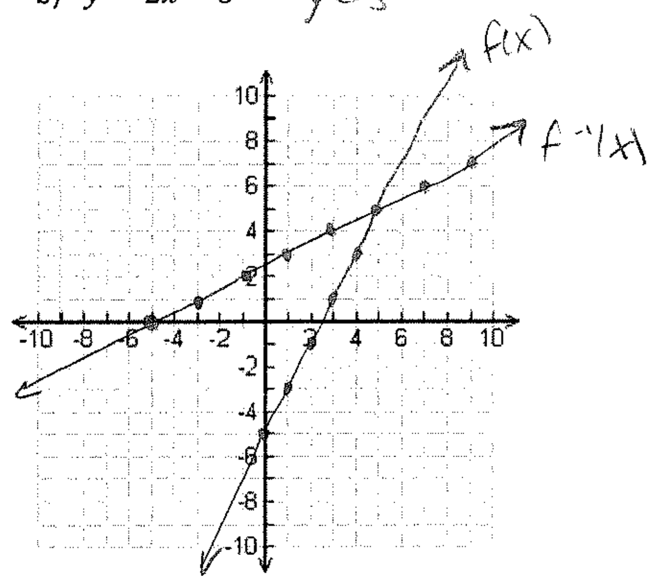


2) Graph the function and the inverse of the function. Is the inverse a function?

a) $y = -\frac{2}{3}x + 4$ yes



b) $y = 2x - 5$ yes



3) List the ordered pairs created by finding $f^{-1}(x)$ given the following table for *f(x)*. Is the inverse a function?

x	-2	0	3
F(x)	-3	1	7

(-3,-2) (1,0) (7,3)

yes. Inverse

4) Given a function, find the inverse algebraically (symbolically). Show all work!

a) $f(x) = 3x - 12$

$x = 3y - 12$

$x + 12 = 3y$

$y = \frac{x+12}{3} = f^{-1}(x)$

b) $g(x) = -\frac{3}{4}x - 12$

$x = -\frac{3}{4}y - 12$

$x + 12 = -\frac{3}{4}y$

$4x + 48 = -3y$

$y = -\frac{4x+48}{3}$

c) $f(x) = \frac{x^2}{4}$

$x = \frac{y^2}{4}$

$\sqrt{4x} = \sqrt{y^2}$

$\sqrt{4x} = y \quad f^{-1}(x) = \sqrt{4x}$

d) $g(x) = \sqrt{x-5} + 4$

$x = \sqrt{y-5} + 4$

$(x-4)^2 = (\sqrt{y-5})^2$

$(x-4)^2 = y - 5$

$(x-4)^2 + 5 = y = g^{-1}(x)$

LT 1-4: *Evaluate and graph piecewise functions.*

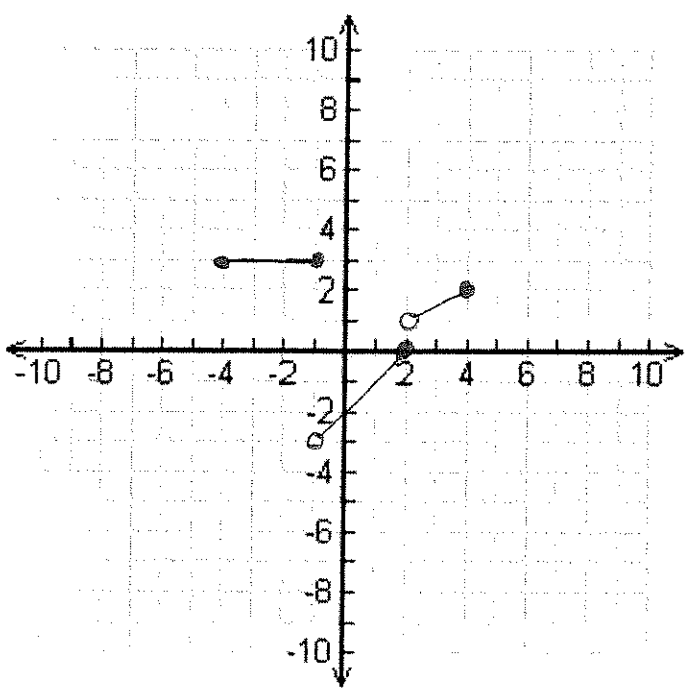
1) Given the function:
$$f(x) = \begin{cases} 3 & \text{if } -4 \le x \le -1 \\ x - 2 & \text{if } -1 < x \le 2 \\ 0.5x & \text{if } 2 < x \le 4 \end{cases}$$

a) Graph the function.

b) Determine the domain of $f(x)$. $\text{Dom}(x) = \{x \mid -4 \le x \le 4\}$

c) Evaluate $f(-2)$, $f(0)$, and $f(3)$. 3, −2, 1.5 or 3/2

(Make sure you can do it both with the graph and without—using the function rule.)



2) Given a function: $f(x) = \begin{cases} 3x - 1 & if\ -5 \le x < 1 \\ 4 & if\ \ 1 \le x \le 3 \\ 6 - x & if\ \ 3 < x \le 5 \end{cases}$

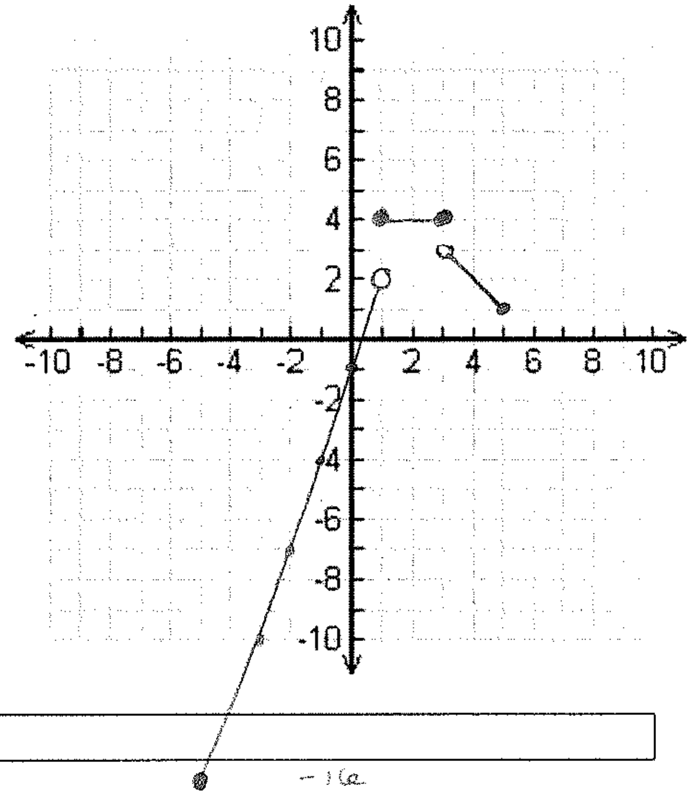
a) Draw the graph.
b) Evaluate *f(x)* at x = -3, 1, 2, and 5
(Use BOTH the function rule and the graph.)

$f(-3) = 3(-3) - 1 = -9 - 1 = -10$

$f(1) = 4$

$f(2) = 4$

$f(5) = 6 - 5 = 1$



LT 1-5: *Find the domain and range..*

Find the domain and range. Use set notation.

a)

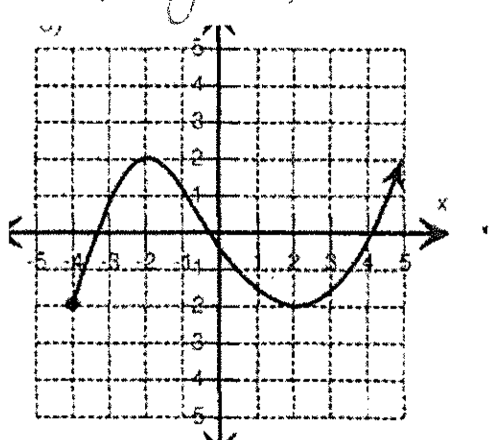
x Length of hallway	3.5	9.5	17.5	4.0	12.0	8.0
y Time in minutes	85	175	295	92	212	153

Dom(x) = {x | 3.5, 4, 8, 9.5, 12, 17.5}
Ran(y) = {y | 85, 92, 153, 175, 212, 295}

b) { (2, 4), (-5, 7), (0, 6), (-4, -3), (9, -2) }

Dom(x) = {x | -5, -4, 0, 2, 9}
Ran(y) = {y | -3, -2, 4, 6, 7}

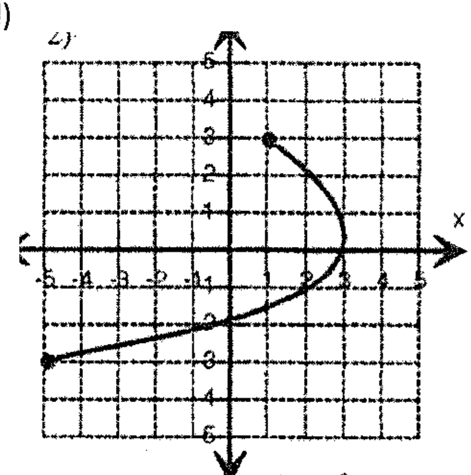
c)



Domain : Dom(x) = {x | -4 ≤ x < ∞}

Range : Ran(y) = {y | -2 ≤ y < ∞}

d)



Domain : Dom(x) = {x | -5 ≤ x ≤ 3}

Range : Ran(y) = {y | -3 ≤ y ≤ 3}