

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.
 Highly Proficient: 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 function values. Show all your work

a. $f(3)$ b. $g(-3)$ c. $h(x-5)$ d. $g(x+4)$

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

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

$$h(x-5) = 2(x-5) + 1 = 2x - 10 + 1 = 2x - 9$$

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

Find x when:

e. $f(x) = -18$ f. $h(x) = 15$

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

$$-22 = -2x$$

$$11 = x$$

$$2x + 1 = 15$$

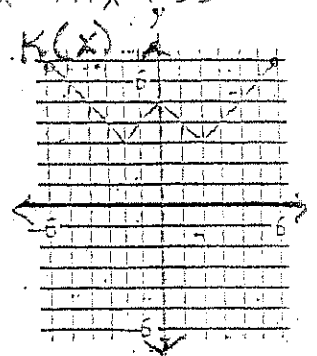
$$2x = 14$$

$$x = 7$$

Given the following graph,

g. find x when $K(x) = 7$
 $x = -6, 6$

h. $K(4) = 5$



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

②

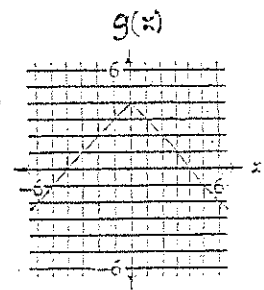
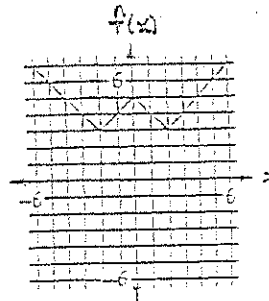
x	f(x)
-2	5
4	-3
3	1
11	7

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

a. find $f(g(11))$
 $g(11) = 4$
 $f(4) = -3$

b. find $g(f(+3))$
 $f(3) = 1$
 $g(1) = 8$

③



a. find $f(g(0))$
 $g(0) = 4$
 $f(4) = 5$

b. find $g(f(-2))$
 $f(-2) = 3$
 $g(3) = 1$

④ Given the functions $f(x) = 3x^2$ and $g(x) = 2x + 1$, find: (Show all work)

a. $f(g(4))$
 $g(4) = 2(4) + 1 = 9$
 $f(9) = 3(9)^2 = 243$

b. $g(f(-3))$
 $f(-3) = 3(-3)^2 = 27$
 $g(27) = 2(27) + 1 = 55$

Highly Proficient: Find the value of a composite function symbolically.

c. $f(g(x))$ d. $g(f(x))$

$$f(g(x)) = 3(2x+1)^2 = 3(4x^2 + 4x + 1) = 12x^2 + 12x + 3$$

$$g(f(x)) = 2(3x^2) + 1 = 6x^2 + 1$$

LT 1-2 Find the sum, difference, product, or quotient of two functions

Highly Proficient: Find a function using more than one operation

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

a. $(f+g)(x)$
 $3x - 6 + x^2 + 4$
 $= x^2 + 3x - 2$

b. $(f-g)(x)$
 $3x - 6 - (x^2 + 4)$
 $= -x^2 + 3x - 10$

c. $(fg)(x)$
 $(3x - 6)(x^2 + 4)$
 $3x^3 + 12x - 6x^2 - 24$
 $= 3x^3 - 6x^2 + 12x - 24$

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

6) Use $f(x)$ and $g(x)$ above and your new functions you found in 5a-d, to evaluate each of the following TWO WAYS: (new function and each individual function)

a. $(f+g)(2)$
 $= (2)^2 + 3(2) - 2$
 $= 4 + 6 - 2$
 $= 8$

b. $(f-g)(-4)$
 $= -(-4)^2 + 3(-4) - 10$
 $= -16 - 12 - 10$
 $= -38$

b. $(fg)(-1)$
 $= 3(-1)^3 - 6(-1)^2 + 12(-1) - 24$
 $= 3(-1) - 6(1) - 12 - 24$
 $= -3 - 6 - 12 - 24$
 $= -45$

c. $\left(\frac{f}{g}\right)(1)$
 $= \frac{3(1) - 6}{(1)^2 + 4}$
 $= \frac{3 - 6}{1 + 4} = -\frac{3}{5}$

7) HP Evaluate using the above functions (you only have to do it one way!)

a. $(f+fg)(3)$
 $3x - 6 + 3x^3 - 6x^2 + 12x - 24$
 $= 3x^3 - 6x^2 + 15x - 30$
 $= 3(3)^3 - 6(3)^2 + 15(3) - 30$
 $= 3(27) - 6(9) + 45 - 30$
 $= 81 - 54 + 45 - 30 = 42$

b. $\left(\frac{f-g}{g}\right)(-2)$
 $= \frac{-x^2 + 3x - 10}{x^2 + 4}$
 $= \frac{-(-2)^2 + 3(-2) - 10}{(-2)^2 + 4}$
 $= \frac{-(4) - 6 - 10}{4 + 4}$
 $= \frac{-20}{8} = -\frac{5}{2}$

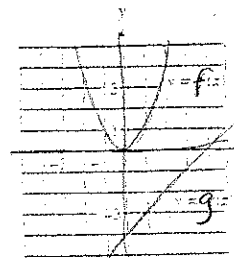
Arithmetic Operations on Functions

Exercises 8. Use the table to evaluate each expression, if possible.

(a) $(f+g)(2)$	(b) $(f-g)(4)$	a) -16
(c) $(fg)(-2)$	(d) $(f/g)(0)$	
5) $f(x)$	3 0 -10 -12	c) 12
$g(x)$	4 -4 -6 -8	d) 0

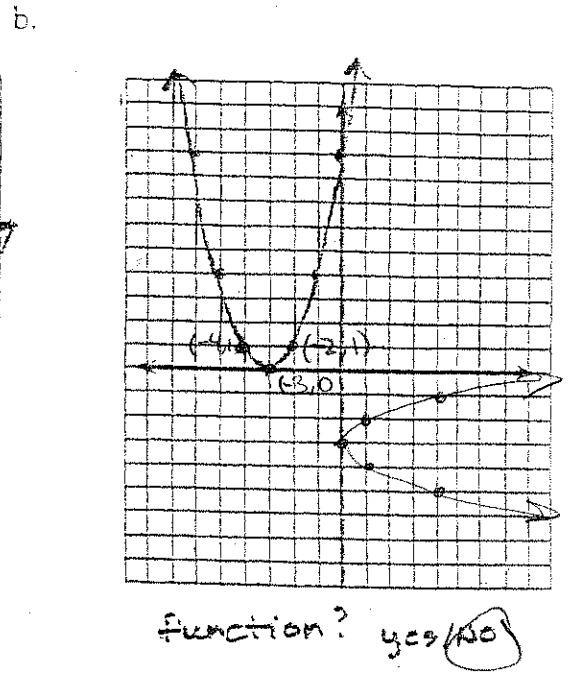
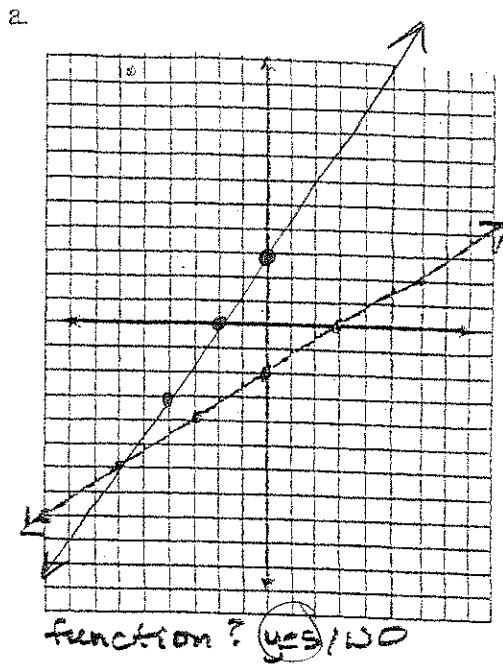
Exercises 9 Use the graph to evaluate each expression.

9) (a) $(f+g)(1) = 2$
 (b) $(f-g)(2) = 6$
 (c) $(fg)(2) = 8$
 (d) $(f/g)(-1) = -\frac{1}{5}$



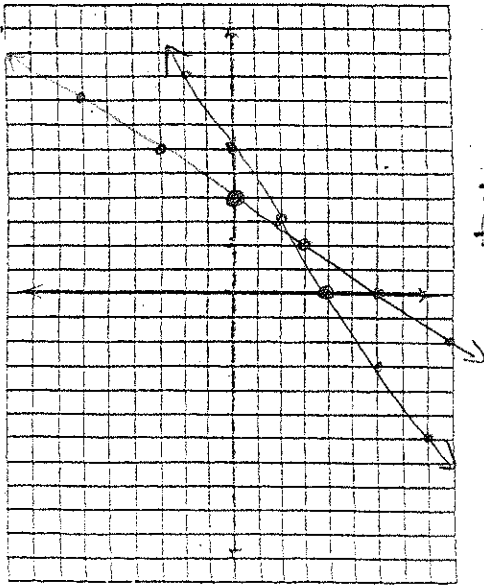
LT 1-3 Finding inverses of functions

1. Graph the inverse of each function shown. State if the inverse is a function.



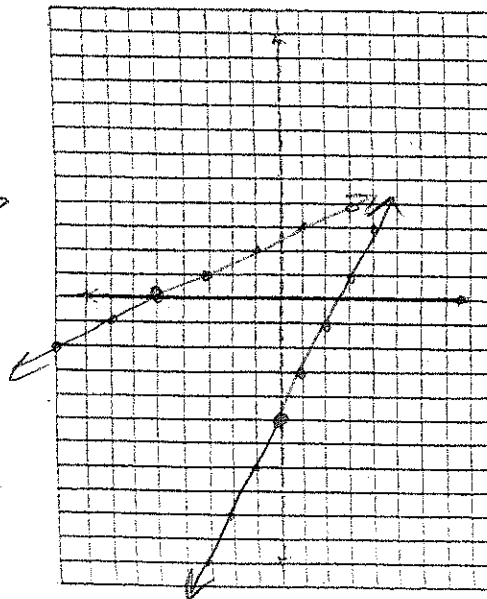
- c. Graph the function and the inverse of the function.

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



Inverse a function?
yes/NO

$$y = 2x - 5$$



Inverse a function?
yes/NO

2. find $f^{-1}(x)$ given the following table for $f(x)$:

x	-2	0	3
$f(x)$	-3	1	7

Inverse a function?
yes/NO

$$f^{-1}(x)$$

x	-3	-2
	1	0
	7	3

3. Given the function, find the inverse. (Show all work) STATE IF THE INVERSE IS A FUNCTION

a. $f(x) = 3x - 12$
 $x = 3y - 12$
 $x - 12 = 3y$
 $\frac{x - 12}{3} = y$
 Yes

b. $g(x) = -\frac{3}{4}x - 12$
 $x = -\frac{3}{4}y - 12$
 $x - 12 = -\frac{3}{4}y$
 $\frac{-4x + 48}{3} = y$ Yes

c. $f(x) = \frac{x^2}{4}$
 $x = \frac{y^2}{4}$
 $4x = y^2$
 $\sqrt{4x} = y$
 NO

d. $g(x) = \sqrt{x-5} + 4$
 $x = \sqrt{y-5} + 4$
 $x - 4 = \sqrt{y-5}$
 $(x-4)^2 = y-5$
 $(x-4)^2 + 5 = y$
 Yes

LT 1-4 Evaluate and graph 3 types of piecewise-defined functions.

Highly Proficient: Write the equations for a graph of a discontinuous linear piecewise function.

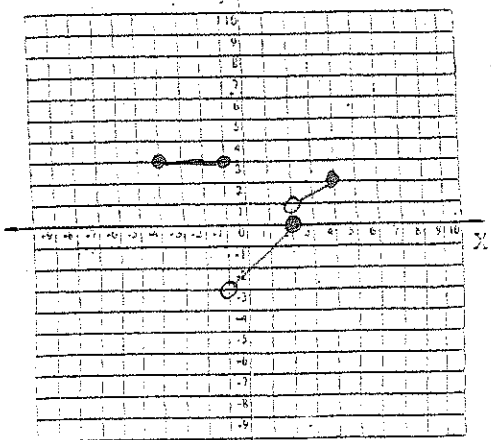
④ Given the function:

$$f(x) = \begin{cases} 3 & \text{if } -4 \leq x \leq -1 \\ x - 2 & \text{if } -1 < x \leq 2 \\ 0.5x & \text{if } 2 < x \leq 4 \end{cases}$$

- (a) Determine the domain of f .
 (b) Evaluate $f(-2)$, $f(0)$, and $f(3)$.
 (c) Graph the function
 (d) Is f continuous on its domain?

Dom(x) = $\{x \mid -4 \leq x \leq 4\}$
 $f(-2) = 3$ $f(0) = -2$ $f(3) = \frac{3}{2}$

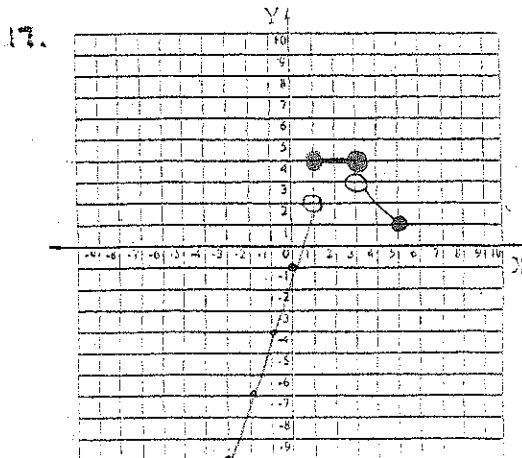
4c



Exercises 15-18: Use $f(x)$ to complete the following.

$$f(x) = \begin{cases} 3x - 1 & \text{if } -5 \leq x < 1 \\ 4 & \text{if } 1 \leq x \leq 3 \\ 6 - x & \text{if } 3 < x \leq 5 \end{cases}$$

15. Evaluate f at $x = -3, 1, 2,$ and 5 .
 $f(-3) = -10$ $f(1) = 4$ $f(2) = 4$ $f(5) = 1$
 16. On what interval is f constant?
 17. Sketch a graph of f . Is f continuous on its domain?
 18. Find the x value(s) where $f(x) = 2$.



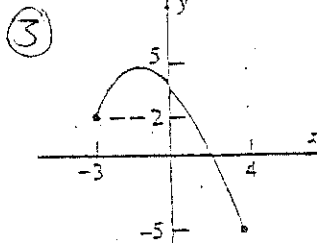
Find the domain and range of each data set.

Length of Hallway	3.5	9.5	17.5	4.0	12.0	8.0
Time (mins)	85	175	295	92	212	153

Dom(x) = $\{x \mid 3.5, 4.0, 8.0, 9.5, 12.0, 17.5\}$
 Ran(y) = $\{y \mid 85, 92, 153, 175, 212, 295\}$

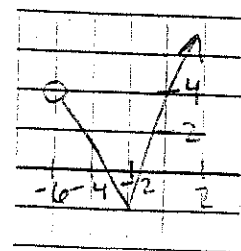
② $\{(2, 4), (-5, 7), (0, 6), (-4, -3), (9, -2)\}$

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



Dom(x) = $\{x \mid -3 \leq x \leq 4\}$
 Ran(y) = $\{y \mid -5 \leq y \leq 5\}$

④



Dom(x) = $\{x \mid -6 < x < 4\}$
 Ran(y) = $\{y \mid -2 \leq y < 4\}$