

Part III:

Function Operations

Lesson 9

We can form new functions by performing mathematical operations with functions. We can add, subtract, multiply, divide and substitute one function into another.

## Sums and Differences of Functions.

Lesson 9

### Sum of Functions.

Example 1. Determine the sum of two functions.

Consider the functions  $f(x) = 2x + 1$  and  $g(x) = x^2$

a. Add  $f(x)$  and  $g(x)$  to determine the equation of function  $h(x) = (f + g)(x)$

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

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

$$h(x) =$$

b. Sketch the graphs of  $f(x)$ ,  $g(x)$  and  $h(x)$  on the same grid.

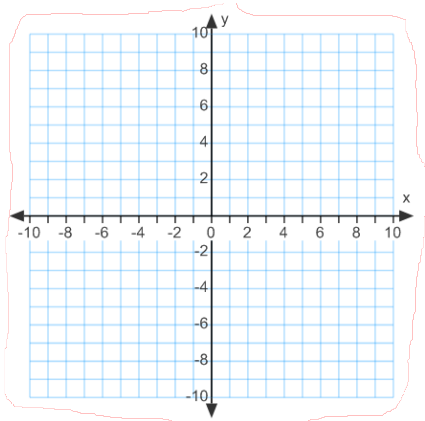


Table of values:

$x$	$f(x)$	$g(x)$	$h(x)$
-2			
-1			
0			
1			
2			

c. State the domain and range of  $h(x)$

Your Turn Determine the sum of two functions.

Consider the functions  $f(x) = x^2$  and  $g(x) = -x + 5$

a. Add  $f(x)$  and  $g(x)$  to determine the equation of function  $h(x) = (f + g)(x)$

State the domain of  $h(x)$

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

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

$$h(x) =$$

b. Sketch the graphs of  $f(x)$ ,  $g(x)$  and  $h(x)$  on the same grid.

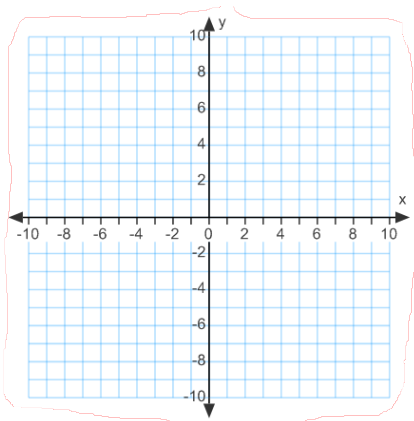


Table of values:

$x$	$f(x)$	$g(x)$	$h(x)$
-2			
-1			
0			
1			
2			

c. State the domain and range of  $h(x)$

Determine the difference of two functions.

Example 2: Consider the functions  $f(x) = \sqrt{x-2}$  and  $g(x) = x-3$ .

a. Determine the equation of the function  $h(x) = (f-g)(x)$

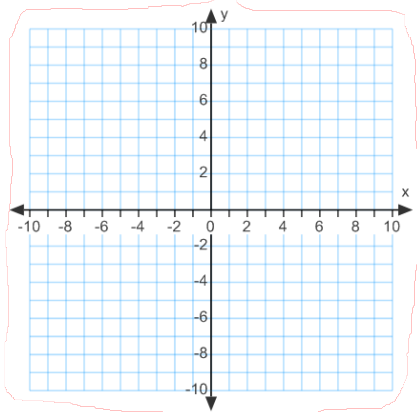
$$h(x) = (f - g)(x)$$

State the domain of  $h(x)$

$$h(x) = f(x) - g(x)$$

$$h(x) =$$

b. Graph the functions  $f(x)$ ,  $g(x)$  and  $h(x)$  on the same grid



$x$	$f(x)$	$g(x)$	$h(x)$
-2			
-1			
0			
1			
2			

Compare the domains of  $f(x)$ ,  $g(x)$  and  $h(x)$

Estimate the range of  $h(x)$

Your Turn: Consider the functions  $f(x) = x^2$  and  $g(x) = 4x - 4$ .

a. Determine the equation of the function  $h(x) = (f - g)(x)$

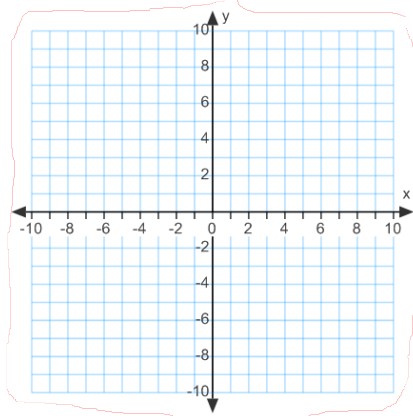
$$h(x) = (f - g)(x)$$

State the domain of  $h(x)$

$$h(x) = f(x) - g(x)$$

$$h(x) =$$

b. Graph the functions  $f(x)$ ,  $g(x)$  and  $h(x)$  on the same grid



$x$	$f(x)$	$g(x)$	$h(x)$
-2			
-1			
0			
1			
2			

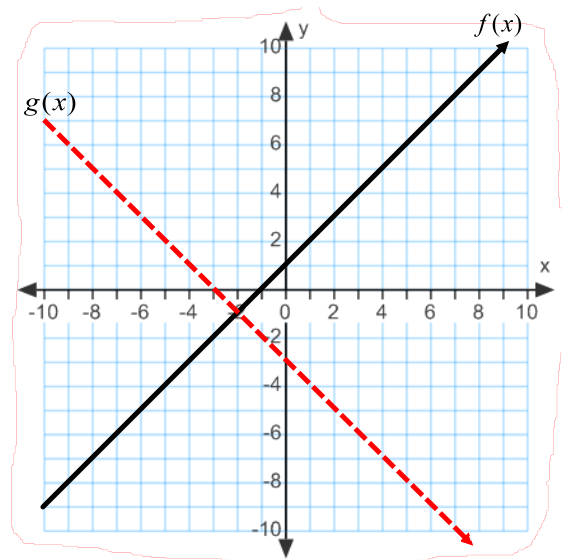
Compare the domains of  $f(x)$ ,  $g(x)$  and  $h(x)$

Estimate the range of  $h(x)$

Example 3: Determine the combined function graph given the graphs of  $f(x)$  and  $g(x)$  .

Sketch the graph of  $h(x) = (f + g)(x)$  given the graphs of  $f(x)$  and  $g(x)$  .

$x$	$f(x)$	$g(x)$	$h(x) = (f + g)(x)$
-4			
-3			
-2			
-1			
0			
1			
2			
3			
4			

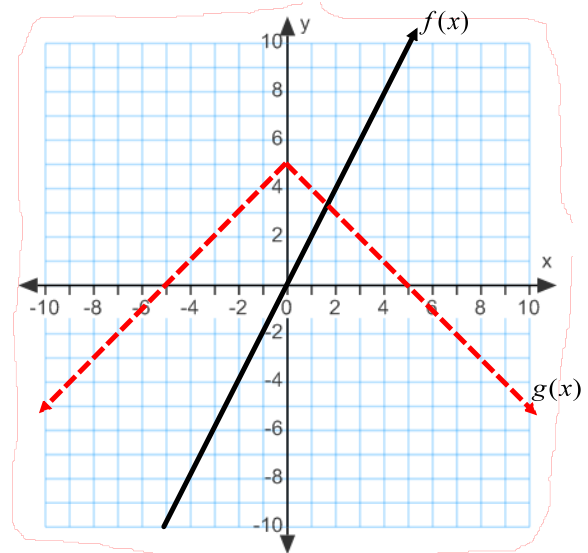


Determine the equation of  $h(x)$

Your Turn: Determine the combined function graph given the graphs of  $f(x)$  and  $g(x)$  .

Sketch the graph of  $h(x) = (f + g)(x)$  given the graphs of  $f(x)$  and  $g(x)$  .

$x$	$f(x)$	$g(x)$	$h(x) = (f + g)(x)$
-4			
-3			
-2			
-1			
0			
1			
2			
3			
4			



Determine the equation of  $h(x)$

Example 4:     Modeling Using Composite Functions

The daily costs for a hamburger vendor are \$135 per day plus \$1.25 per hamburger sold. He sells each burger for \$3.50. The maximum number of burgers that he can sell in a day is 300.

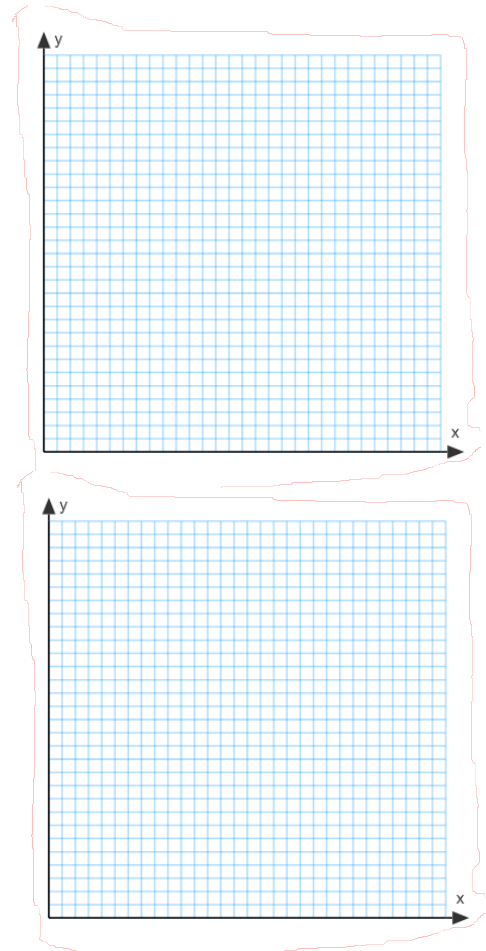
- a. Write the equations to represent the total cost,  $C$ , and the total revenue,  $R$ , as a function of the number,  $n$ , of hamburgers sold.

- b. Graph  $C(n)$  and  $R(n)$  on the same axis.

- c. The break even point is where  $C(n) = R(n)$ . Identify this point.

- d. Develop an algebraic and graphical model for the profit function.

- e. What is the maximum daily profit the vendor can earn?





Your Turn: A communications company manufactures a mobile phone for \$25 per unit plus a fixed operating cost of \$45000. The mobile phones are sold for \$100 per unit.

- a. Write the equations to represent the total cost,  $C$ , and the total revenue,  $R$ , as a function of the number,  $n$ , of mobile phones sold.
  
  
  
  
  
  
  
  
  
  
- b. Determine a function to represent the profit,  $P$ , of units sold.
  
  
  
  
  
  
  
  
  
  
- c. Use your calculator to determine the break even point for the manufacturer of these cell phones



# Homework

1. Text Pages 483 - 487, Exercises # 1 - 12, 17, 22, C1, C2
2. Handout BLM 10-2: "Sum and Difference of Functions".



## Attachments

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Translations Assignment 1.doc