

MATH 3208

CHAPTER 1: FUNCTIONS

SUMS AND DIFFERENCES OF FUNCTIONS

To combine two functions, $f(x)$ and $g(x)$, add or subtract as follows:

SUM OF FUNCTIONS

$$h(x) = (f + g)(x) \text{ or } h(x) = f(x) + g(x)$$

DIFFERENCE OF FUNCTIONS

$$h(x) = (f - g)(x) \text{ or } h(x) = f(x) - g(x)$$

EXAMPLE 1

Given the functions $f(x) = 4x - 2$, $g(x) = -x + 3$, and $h(x) = (f + g)(x)$.

(a) Determine the function $h(x)$ and evaluate $h(-4)$.

$$h(x) = (4x - 2) + (-x + 3)$$

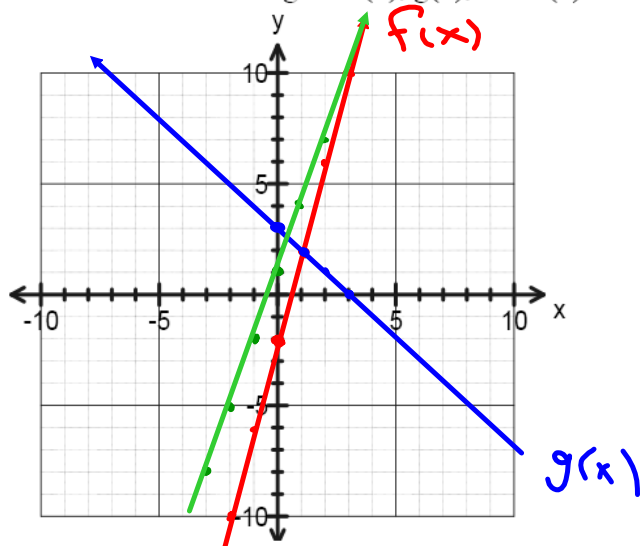
$$h(x) = 3x + 1$$

(b) Complete the following table.

$$h(-4) = 3(-4) + 1 = -11$$

x	f(x)	g(x)	h(x)
-1	-6	4	-2
0	-2	3	1
1	2	2	4

(c) Sketch the graphs of $f(x)$, $g(x)$, and $h(x)$ on the coordinate axes below. State the domain and the range of $f(x)$, $g(x)$, and $h(x)$.



$$\begin{aligned} f(x) : \text{Domain } \{x | x \in \mathbb{R}\} \\ g(x) : \text{ " } \{x | x \in \mathbb{R}\} \\ h(x) : \text{ " } \{x | x \in \mathbb{R}\} \end{aligned}$$

EXAMPLE 2

Given the functions $f(x) = \sqrt{x-2}$, $g(x) = x+3$, and $h(x) = (f-g)(x)$.

$f(x) - g(x)$

(a) Determine the function $h(x)$ and evaluate $h(6)$.

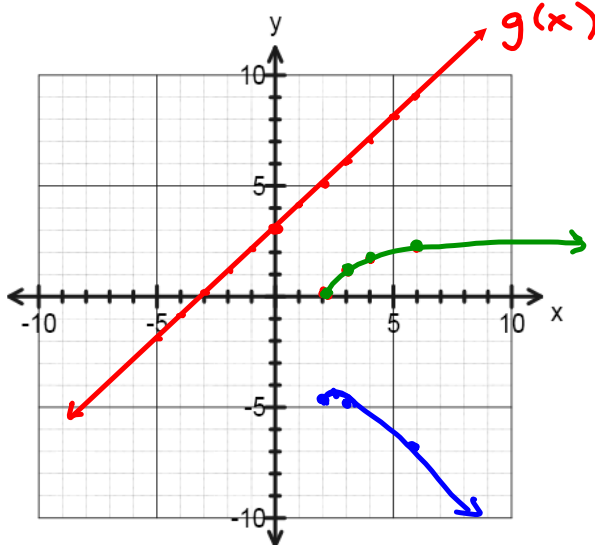
$h(x) = \sqrt{x-2} - (x+3)$ $h(x) = \sqrt{x-2} - x - 3$

(b) Complete the following table.

$h(6) = -7$

x	f(x)	g(x)	h(x)
0	undefined	3	und
1	undefined		und
2	0	5	-5
3	1	6	-5
4	$\sqrt{2}$	7	$\sqrt{2}-7$

(c) Sketch the graphs of $f(x)$, $g(x)$, and $h(x)$ on the coordinate axes below. State the domain and the range of $f(x)$, $g(x)$, and $h(x)$.



for $f(x) = \sqrt{x-2}$
 $D: \{x | x \geq 2, x \in \mathbb{R}\}$

for $g(x)$
 $D: \{x | x \in \mathbb{R}\}$

for $h(x) = \sqrt{x-2} - x - 3$
 $D: \{x | x \geq 2, x \in \mathbb{R}\}$

NOTE: As seen in examples 1 and 2, the domain of the combined function $h(x)$ is the domain that is common to both $f(x)$ and $g(x)$.

EXAMPLE 3

Given the functions $f(x) = x^2$, $g(x) = 4x - 3$, and $h(x) = (f - g)(x)$. $f(x) - g(x)$

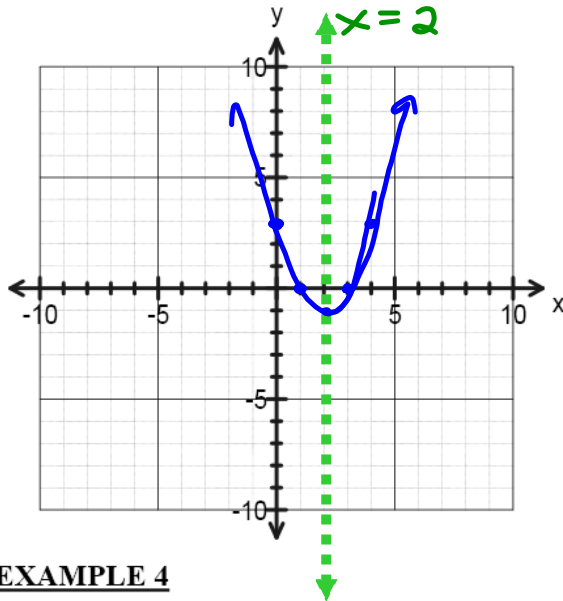
- (a) Determine the function $h(x)$ and evaluate $h(10)$.

$$h(x) = x^2 - (4x - 3)$$

$$h(x) = x^2 - 4x + 3$$

$$h(10) = 63$$

- (b) Sketch the graph of $h(x)$ and state the domain and the range of $h(x)$.



$$\text{Domain: } \{x \mid x \in \mathbb{R}\}$$

$$\text{Range: } \{y \mid y \geq -1, y \in \mathbb{R}\}$$

EXAMPLE 4

Each month, a publishing company creates and sells "Infinity Math" magazine. It costs the company \$4 for each magazine produced with extra fixed costs of \$120. The company sells each magazine for \$9.

- Write an equation to represent the total cost, C , as a function of the number, n , of magazines produced. Write an equation to represent the total revenue, R , as a function of the number, n , of magazines sold.
- Profit, P , is the difference between revenue and cost. Write a function representing P in terms of n .
- How many magazines must be sold in order for the company to make a profit?

QUESTIONS Pages 483 – 485, # 1a, b, 2a, b, 3a, b, 4, 6, 9, 10, 11, 13