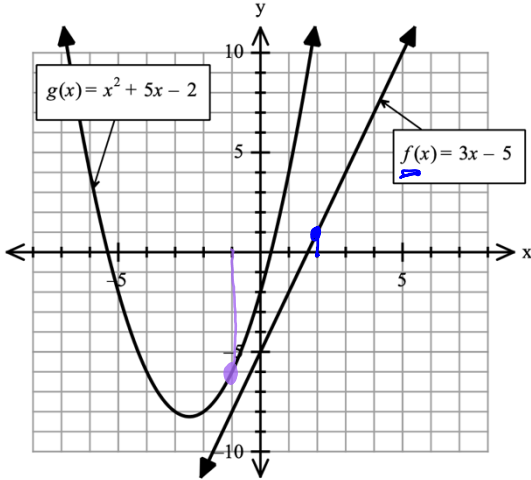


1.3

Date: 8/28/23

Objective: I can add, subtract, multiply and evaluate polynomials in function notation.

Function Notation: $f(x)$ is another name for y . This notation is read "f of x". The parentheses do not imply multiplication.



Evaluating Functions

Let $f(x) = 3x - 5$ and $g(x) = x^2 + 5x - 2$. If we want to evaluate the function at a specific x -value, we replace each x in the original function with the specific x -value.

Examples:

$f(2) = 3(2) - 5$ $6 - 5$ $1 = y$ $(2, 1)$	$g(-1) = (-1)^2 + 5(-1) - 2$ $1 - 5 - 2$ -6
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Practice: Let $f(x) = 3x - 5$ and $g(x) = x^2 + 5x - 2$. Evaluate the

following using the equations & the graph.

1. $f(0)$

$$3(0) - 5 = -5$$

3. $f(-5)$

$$3(-5) - 5 = -20$$

2. $g(2)$

$$(2)^2 + 5(2) - 2$$

$$12$$

4. $g(-3)$

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

$$-8$$

Combining Functions – We can add, subtract, multiply, or divide functions.

Examples: Let $f(x) = x - 5$ and $g(x) = x^2 + 5x - 2$. The combination of functions is set up for you.

Simplify the expression by performing the requested operations. Give your answer in standard form.

$(f + g)(x)$ or $f(x) + g(x)$	$(f - g)(x)$ or $f(x) - g(x)$	$(fg)(x)$ or $f(x) \cdot g(x)$
$(f + g)(x) =$ $(x - 5) + (x^2 + 5x - 2)$ $x^2 + 6x - 7$	$(f - g)(x) =$ $(x - 5) - (x^2 + 5x - 2)$ $-x^2 - 4x - 3$	$(fg)(x) =$ $(x - 5)(x^2 + 5x - 2)$ $x^3 - 27x + 10$

Practice: Let $f(x) = x + 3$ and $g(x) = x^2 - 1$. Perform or evaluate the indicated operations. Give your answer in standard form.

1. $(f + g)(x)$

$$(x+3) + (x^2-1)$$

$$x^2 + x + 2$$

2. $f(0) + 2g(0)$

$$((0)+3) + 2((0)^2-1)$$

$$3 - 2 = 1$$

3. $(g - f)(x)$

$$(x^2-1) - (x+3)$$

$$x^2 - x - 4$$

4. $-2(fg)(3)$

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

$$-96$$

5. $g(-1) - f(-1)$

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

$$0 - 2 = -2$$

6. $(gf)(x)$

Composition of Functions

Composing functions means putting one inside the other.

We use the symbol \circ to indicate function composition.



For example, $(f \circ g)(x)$ or $f(g(x))$ means “ f of g of x .” You plug $g(x)$ into $f(x)$.

Example: Let $f(x) = x + 3$ and $g(x) = x^2 - 1$. Find $(f \circ g)(x)$.

1. Plug $g(x)$ into $f(x)$ by replacing each x with $(x^2 - 1)$	$(x^2 - 1) + 3$ ✱
2. Simplify	$x^2 + 2$

Practice: Find the indicated composition of functions. Let $f(x) = x + 5$ and $g(x) = x^2 + 3x - 7$. Give your answer in standard form.

1. $(f(g(x)))$ or _____

$$(x^2+3x-7) + 5$$

$$x^2 + 3x - 2$$

2. $(g \circ f)(x)$ or _____

$$(x+5)^2 + 3(x+5) - 7$$

$$(x+5)(x+5) + 3x + 15 - 7$$

$$x^2 + 10x + 25 + 3x + 15 - 7$$

$$x^2 + 13x + 33$$

3. $(f \circ f)(x)$

$$(x+5) + 5$$

$$x + 10$$

Practice: Let $f(x) = x + 3$ and $g(x) = x^2 - 1$. Perform or evaluate the indicated operations. Give your answer in standard form.

4. $(f \circ g)(x)$

5. $(g(f(x)))$

6. $(g(f(2)))$

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

$$24$$

Functions in Real Life

You make a purchase at a local hardware store, but what you've bought is too big to take home in your car. For a small fee, you arrange to have the hardware store deliver your purchase for you. You pay for your purchase, plus the sales taxes of 7.5%, plus the delivery fee of \$20.

1. Identify each part of the function given on the purchase amount x .

$$t(x) = 1.075x \quad \text{represents } \underline{\text{purchase with tax}}$$

$$f(x) = x + 20 \quad \text{represents } \underline{\text{purchase with delivery}}$$

2. Calculate and interpret $(f \circ t)(x)$ and $(t \circ f)(x)$. Which results in a lower cost to you?

$$(1.075x) + 20$$

$$1.075(x + 20) \\ 1.075x + 21.5$$

3. Suppose taxes, by law are not to be charged on delivery fees.

- a) Which composite function must then be used?

$$1.075x + 20$$

- b) Find out the total cost if your purchased amount x is \$50.

$$1.075(50) + 20 \\ \$73.75$$

A manufacturer of Android tablets has monthly fixed costs of \$25,200 and a variable cost of \$300 per unit for its entry level tablet. The company sells this tablet for \$429 each.

1. Write a function for the monthly costs.

$$C(x) = \underline{25200 + 300x}$$

$x = \# \text{ of tablets}$

2. Write a function for the monthly total revenue.

$$R(x) = \underline{429x}$$

3. Write a function for the monthly total profit.

$$P(x) = \underline{429x - (25200 + 300x)}$$

4. Evaluate and explain what it means.

$$129x - 25200$$

a) $C(450) = 25200 + 300(450) = \$160,200$
To make 450 tablets it costs \$160,200.

b) $R(450) = 429(450) = \$193,050$
To sell 450 tablets, I will make \$193,050.

c) $P(450) = 129(450) - 25200$ OR $193,050 - 160,200$

$$\$32,850$$

when I sell 450 tablets, your profit \$32,850.

