

EXERCISE 1

Directions: Determine the domain and range of the given relation and decide whether the relation is function. **[3 points each]**

1. $\{(4, 2), (5, 0), (-2, 6), (0, 1)\}$
2. $\{(-8, 2), (\frac{1}{2}, \frac{3}{5})\}$
3. $\{(7, 2), (7, -2), (7, 11), (10, -3)\}$
4. $\{(w, s) \mid s^2 = w\}$
5. $\{(x, y) \mid y = x^2 - 2x + 1\}$
6. $\{(0.02, 0.002), (0.20, 0.02)\}$
7. $\{(5, 2), (-1, 5), (5, 6)\}$
8. $\{(1, 6), (2, 12), (3, 18), \dots (n, 6n)\}$
9. $\{(x, y) \mid y^4 = x\}$
10. $\{(c, 1), (c, 2), (c, 3), (c, 4)\}$

EXERCISE 2

Directions: Identify the domain for each relation using the set builder notation. **[2 points each]**

1. $y = 5x - 4$
2. $y = x^3 + 2x^2 + x + 7$
3. $f(x) = |3x + 2|$
4. $x^2 + y^2 = 16$
5. $f(x) = \sqrt{x^2 - 24x + 144}$
6. $g(x) = \llbracket x \rrbracket - x$
7. $0 = \frac{3}{4}y^2 + 6x$
8. $6x^2 = 15y$
9. $f(x) = \frac{x^2+4}{(3x+5)(x+8)}$
10. $g(x) = \begin{cases} x - 1 & , x < 3 \\ 5 & , x = 3 \\ 2x + 1 & , x > 3 \end{cases}$

EXERCISE 3

Directions: Give a function that represents each situation. **[2 points each]**

1. Mang Ambo, a mango farmer, sells ripe mangoes either per piece or bulk. He sells mangoes at P10.00 each for orders less than 50 pieces and P450.00 for a bulk of 50 pieces and P8.00 for each excess mango after that. Write the required piecewise function.
2. A certain Liquor is sold for P150.00 each. With an increasing public demand, a vendor decides to sell it for P140.00 each if someone buys more than 15 bottles. Express the cost with respect to the number of bottled liquors sold.
3. A rectangular box is to be made from a piece of cardboard 20 cm long and 8 cm wide by cutting out identical squares with side x from the four corners and turning up the sides. Define a function representing the volume of the box.
4. A horseback riding charges P50.00 for the first 300 meters and additional P10.00 for a ride greater than 300 meters. Express the function describing the amount of horseback riding.

5. Rental car charges P100.00 for the first three hours and an excess of P20.00 for each hour (or a fraction of it) after that. If you rent a car for more than ten hours, a fee of P500.00 shall be charged. Represent the rental car fee in piecewise function.

Reflection:

What have you learned from this topic?

References:

Verzosa, D.B, et.al (2016). General Mathematics. Quezon City, Manila
Alferez, G. S. (2014). Introduction to Calculus. Quezon City, Manila
Leithold, L. (1996). The Calculus 7. New York City.

EXERCISE 1

Directions: Evaluate the following functions at $x = 3.5$.

[1 point each]

1. $f(x) = 7x - 1$
2. $g(x) = x^2 - 4$
3. $h(x) = |4x - 21| - 2$
4. $t(x) = 2 \cdot 3^{x-1.5}$
5. $s(x) = \sqrt{x^2 - 2x + 4}$
6. $r(x) = -2^{-2x}$
7. $w(x) = 3^{2x-5}$
8. $q(x) = \lfloor x \rfloor + 4$
9. $f(x) = \frac{x+4}{x^2-2}$
10. $f(x) = \begin{cases} 5x & , x < 2 \\ x^2 - 1 & , 2 \leq x < 5 \\ x^3 + 2 & , x \geq 5 \end{cases}$

EXERCISE 2

Directions: Evaluate each function.

[1 point each]

1. $f(x) = |x + 2| + 4$, find $f(-8)$
2. $h(x) = 3^{3x-2}$, find $h(2)$
3. $q(x) = 4^{3x}$, find $q(\frac{1}{2})$

For numbers 4-5, use the function below

$$f(x) = x^2 + 5x + 4$$

4. Find $f(2)$
5. Find $f(x + 2)$

For numbers 6-8, use the function below

$$f(x) = \begin{cases} x + 2 & , x \leq -4 \\ \sqrt{16 - x^2} & , -4 < x < 4 \\ 2 - x & , x \geq 4 \end{cases}$$

6. Find $f(-5)$
7. Find $f(2)$
8. Find $f(5)$

For items 9-10, given $f(x) = \sqrt{x+4}$,

9. Find $f(x^2 - 4)$

10. Find $\frac{f(x+h)-f(x)}{h}, h \neq 0$

EXERCISE 3

Directions: Solve the given problems

[3 points each]

1. An internet café charges P25.00 per hour (or a fraction of an hour) for the first four hours and an extra of P15.00 per hour for each next hour. What is the amount paid for following time?
 - a. 2 hrs.
 - b. 3.5 hrs.
 - c. 6 hrs.
 - d. 7.2 hrs.
2. In a certain city, the Philippine Statistics Office has recorded a total population of 680,000 in the year 2018. The population increases at the rate of 0.25% annually. Suppose the rate of increase is constant. Determine the population in the following years.
 - a. 10 yrs.
 - b. 14 yrs.
 - c. 17 yrs.
3. Driving lessons require a rental car fee of P 500.00 for the first 8 km. and for every kilometer added charges an additional fee of P 50.00. How much will it cost for the following distance.
 - a. 7 km.
 - b. 9 km.
4. A stone is thrown straight up from a building with a velocity, in m/s, given by $V(t) = 15 - 9.8t$. After t seconds, calculate the following velocities. Make an interpretation of the results.
 - a. $V(0)$
 - b. $V(1)$
5. In particular bacteria culture, if $p(x)$ bacteria are present at x minutes, then $p(x) = Ae^{0.03x}$ such that A is a constant. Initially, there are 1200 bacteria present, calculate the number of bacteria after:
 - a. 30 minutes
 - b. 1 hr.
 - c. 1.5 hrs.

$$\begin{aligned}
&= f[2 - 2] \\
&= f[0] \\
&= 0^2 + 3(0) - 4 \\
&= -4
\end{aligned}$$

Example 3.

Given the functions, $f(x) = 2x - 1$, $g(x) = \sqrt{2x + 1}$, $h(x) = \lfloor x \rfloor + 1$

- Find and simplify $(g \circ f)(x)$.
- Find and simplify $(h \circ g)(10)$
- Find and simplify $h(2.1)[f(3) + g(4)]$

Solution:

a. $(g \circ f)(x) = g(f(x)) = \sqrt{2x - 1 + 1} = \sqrt{2x}$

b. $(h \circ g)(10) = h(g(10))$
 $= \lfloor g(10) \rfloor + 1$
 $= \lfloor \sqrt{2(10) + 1} \rfloor + 1$
 $= \lfloor \sqrt{21} \rfloor + 1$
 $= 4 + 1$
 $= 5$

c. $h(2.1)[f(3) + g(4)] = [\lfloor 2.1 \rfloor + 1][(2(3) - 1) + \sqrt{2(4) + 1}]$
 $= [2 + 1][5 + 3]$
 $= 24$

Learning Competency

Performs addition, subtraction, multiplication, division, and composition of functions
(GM_M11GM-Ia-3)

EXERCISE 1

Directions: Perform the indication operation in the following functions. **[1 point each]**

A. Given the functions $f(x) = 3x + 4$ and $g(x) = 3x^2$, find:

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

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

3. $(fg)(x)$

4. $(f - g)(2)$

5. $(f + g)(-3)$

6. $\left(\frac{f}{g}\right)(x)$

B. Given $f(x) = x^2 + 1$, $g(x) = 2 - x$ and $q(x) = \frac{1}{x^2 + 4x - 3}$

7. $(f + g + q)(x)$

8. $(q - g)(-1)$

9. $(fgq)(0)$

10. $\left(\frac{fg}{q}\right)(2)$

EXERCISE 2

Directions: Solve the following functions

[2 points each]

A. Let $f(x) = 2x + 4$, $g(x) = x^2 - 16$ and $h(x) = x^3$. Find:

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

2. $(h \circ g)(x)$

3. $f(f(f(5)))$

B. Let $f(x) = x^2 + 1$, $g(x) = \frac{1}{x}$ Find:

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

5. $(g \circ g)(4)$

EXERCISE 3

Directions: Perform the indicated conditions in each function.

[2 points each]

A. Let $f(x) = x^4$, $g(x) = \sqrt{x}$, $h(x) = x - 2$ and $p(x) = 3x$. Express each function t as a composite of three of these four functions.

1. $t(x) = 3(x - 2)^4$

2. $t(x) = (3x - 6)^4$

3. $t(x) = \sqrt{(x - 2)^4}$

4. $t(x) = \sqrt{x^4 - 2}$

5. $t(x) = (3x)^2$

B. Let $f(x) = 2x - 3$, $g(x) = \frac{x+3}{2}$ and $h(x) = 3x + 2$

[5 points each]

1. Show that $f(g(x)) = g(f(x))$ for all x .

2. Show that $f(h(x)) \neq h(f(x))$ for any x .

Reflection:

Please share your insights in this topic.

References:

Verzosa, D.B, et.al (2016). *General Mathematics*. Quezon City, Manila
Alferez, G. S. (2014). *Introduction to Calculus*. Quezon City, Manila
Leithold, L. (1996). *The Calculus 7*. New York City.
Brown, R.G (1994). *Advanced Mathematics, Precalculus with Discrete Mathematics and Data Analysis*, Houghton Mifflin, Boston.
Rolando, M.A, et.al (2002). *Differential Calculus*. Philippines.