Full Name: SOL'N S

Date: September 19th, 2023

26

PART A

1. Complete the following if $f(x) = 4x - 1$ and $g(x) = -x^2 + 1$

a) Determine $f(-6) = 4(-6) - 1$
$$= -24 - 1$$
$$= -25 \checkmark$$

b) $g(-4) = -(-4)^2 + 1$
$$= -16 + 1$$
$$= -15 \checkmark$$

c) Determine $f(a+1) - f(a)$
$$= [4(a+1) - 1] - [4(a) - 1]$$
$$= 4a + 4 - 1 - 4a + 1$$
$$= 4 \checkmark$$

d) Determine $g \circ f(x)$
$$= g(f(x))$$
$$= g(4x - 1)$$
$$= -(4x - 1)^2 + 1$$
$$= -(16x^2 - 8x + 1) + 1$$
$$= -16x^2 + 8x - 1 + 1 \checkmark$$
$$= -16x^2 + 8x$$

e) If $g(x) = -35$, solve for x.
$$-x^2 + 1 = -35$$
$$36 = x^2$$
$$\pm 6 = x \checkmark$$

f) Simplify $3g(3a) - f(2a^2)$
$$= 3[-(3a)^2 + 1] - [4(2a^2) - 1]$$
$$= 3(-9a^2 + 1) - (8a^2 - 1)$$
$$= -27a^2 + 3 - 8a^2 + 1$$
$$= -35a^2 + 4 \checkmark$$

6

2. Use the graph of $y = f(x)$ shown to the right to answer the following:

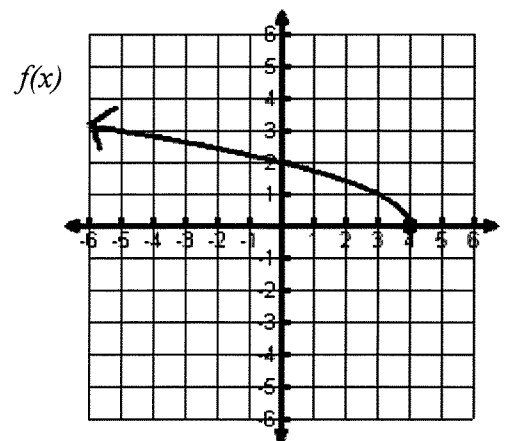a) Determine $f(0) = 2 \checkmark$

$f(x)$

b) Determine the value(s) of x such that $f(x) = 1$ $\checkmark$
$$x = 3 \checkmark$$

4

c) Determine the domain and range of $f(x)$ $\checkmark$
$$D = \{x \in R \mid x \leq 4\}$$
$$R = \{y \in R \mid y \geq 0\}$$ $\checkmark$

3. Complete the chart below:

4

	Interval Notation	Set-builder Notation
a)	$x \in (-6, 5), x \in R$	$\{x \in \mathcal{R} \mid -6 < x < 5\}$
b)	$x \in (-\infty, 10), x \in R$	$\{x \in \mathcal{R} \mid x < 10\}$
c)	$x \in [-3, 9), x \in \mathcal{R}$	$\{x \in R \mid -3 \leq x < 9\}$
d)	$x \in [5, \infty), x \in \mathcal{R}$	$\{x \in R \mid x \geq 5\}$

4. State the domain and range of the provided graphs:

a)
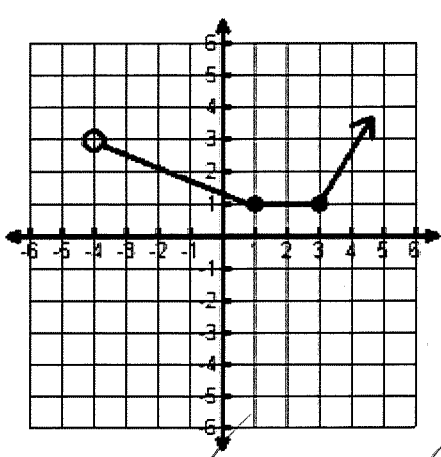
b)
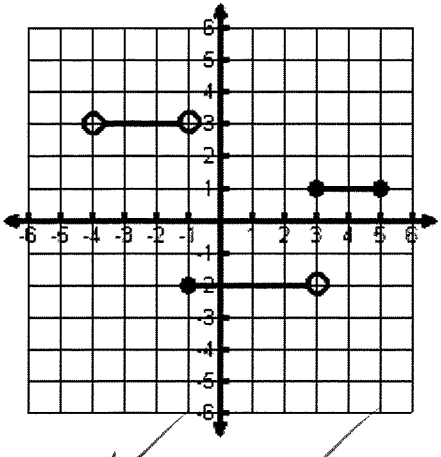
4

Domain	Range
$\{x \in \mathbb{R} \mid x > -4\}$	$\{y \in \mathbb{R} \mid y \geqslant 1\}$

Domain	Range
$\{x \in \mathbb{R} \mid -4 < x \leqslant 5\}$	$\{-2, 1, 3\}$

5. Determine the range of the following function:

$f(x) = -4x^2 - 32x + 9$

$= -4(x^2 + 8x) + 9$

$= -4(x^2 + 8x + 16 - 16) + 9$

$= -4(x^2 + 8x + 16) + 64 + 9$

$= -4(x + 4)^2 + 73$

$R = \{y \in \mathbb{R} \mid y \leqslant 73\}$

$x = \dfrac{-b}{2a}$

$x = \dfrac{-(-32)}{2(-4)}$

$x = -4$

$f(-4) = -4(-4)^2 - 32(-4) + 9$

$= 73$

$R = \{y \in \mathbb{R} \mid y \leqslant 73\}$

$\checkmark$ $\times$

2

6. Complete the chart below:

6

Relation	Is it a function? (write y or n)	Domain	Range
a) $x^2 + y^2 = 100$	n	$x \in [-10, 10]$	$y \in [-10, 10]$
b) $y = 3$	y	$x \in \mathbb{R}$	$\{3\}$
c) $y = \frac{1}{2}x - 3$	y	$x \in \mathbb{R}$	$y \in \mathbb{R}$
e) $y = -\frac{1}{2}(x - 33)^2 + 65$	y	$x \in \mathbb{R}$	$y \in (-\infty, 65]$