1. Consider the function:

$$f: \mathbb{R} \to \{y \mid 0 \le y \le 4, y \in \mathbb{Z}\}$$

What is the range of f?

a. The integers

b. The reals

c. The interval $[0, 4]$

d. The set $\{0,1,2,3,4\}$

2. Consider the relation $g = \{(1,4), (3,4), (2,1)\}$

Which of the following are true?

a. $g: 3 \mapsto 4$

b. g is 1-to-1

c. $g(1) = 2$

d. $g(4)$ is undefined

3. Given the function:

$$h(x) = f(g(x)) = \frac{4}{9x^2} + 1$$

Which of the following functions are valid pairs of f and g

a. $f(x) = \frac{4}{x^2} + 1$, $g(x) = 3x$

b. $f(x) = \frac{4}{x}$, $g(x) = 9x^2 + 1$

c. $f(x) = \frac{1}{x^2}$, $g(x) = \frac{3x}{2} + 1$

d. $f(x) = x^2 + 1$, $g(x) = \frac{2}{3x}$

4. If $f(2) = 5$ and $g(5) = 7$ then which of the following are true?

a. $(f \circ g)(2) = 7$

b. $(f \circ g)(5) = 5$

c. $(g \circ f)(2) = 7$

d. $(g \circ f)(5) = 5$

5. Which of the following expressions shows **a horizontal compression** AND a **shift right**?

a. $T: (x, y) \mapsto (3x + 2, y)$

b. $T: (x, y) \mapsto \left(\frac{1}{4}x + 1, y\right)$

c. $T: (x, y) \mapsto (2x - 1, y)$

d. $T: (x, y) \mapsto \left(\frac{1}{5}x + 3, y\right)$

e. $g(x) = f(3x + 2)$

f. $g(x) = f\left(\frac{1}{4}x + 1\right)$

g. $g(x) = f(2x - 1)$

h. $g(x) = f\left(\frac{1}{5}x + 3\right)$

6. Given the following transformation which is an accurate description of the transformation?

$$T: \mathbb{R}^2 \to \mathbb{R}^2$$
$$T: (x, y) \mapsto \left(-x, \frac{2}{3}y - 5\right)$$

a. Reflected over the x-axis, vertically compressed by $\frac{3}{2}$, down 5.

b. Reflected over the y-axis, vertically compressed by $\frac{3}{2}$, down 5.

c. Reflected over the x-axis, vertically expanded by $\frac{3}{2}$, up 5

d. Reflected over the y-axis, vertically expanded by $\frac{3}{2}$, up 5

7. Which of the following are true about f and f^{-1} ?

a. They are reflected over the line $y = x$

b. They are reflected over the line $y = -x$

c. $f(f^{-1}(x^2)) = x^2$

d. $f^{-1}(x) = \frac{1}{f(x)}$

e. f^{-1} is 1-to-1

f. The inverse of f^{-1} is f

8. If $f: (-\infty, 1] \to [0, \infty)$ and $f: x \mapsto \sqrt{1-x}$ then which of the following are true of f^{-1}?

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

a. $f^{-1}: (-\infty, 1] \to [0, 1]$

b. $f^{-1}: [0, \infty) \to (-\infty, 1]$

c. $f^{-1}: x \mapsto 1 - x^2$

d. $f^{-1}: x \mapsto (x-1)^2$

e. $f^{-1}: \sqrt{1-x} \mapsto x$

f. $f^{-1}: x \mapsto (-x+1)^2$

9. Consider that f has a domain of $[2,8]$ and range of $[-2,4]$. A transformation T transforms $\mathbb{R}^2$ as follows:

$$T: (x, y) \mapsto \left(2x + 1, -\frac{1}{2}y - 3\right)$$

How has the domain and range of f^{-1} changed after the transformation? (*Reasoning: Strategies*)

$f: [2,8] \to [-2,4]$ $\quad f^{-1}: [-2,4] \to [2,8]$

vert

→ Rox

→ comp by 2

→ down 3

horiz

exp by 2

right 1

Domain

$[-2,4] \to [-4,8] \to$ new domain of f^{-1} $[-3,9]$

Rng

$[2,8] \to [-8,-2] \to [-4,-1] \to$ new range of f^{-1} $[-7,-4]$