

Name

Score

Show work in each problem as much as possible. Each question carries 5 points.

1. Complete the following table given that

$$f(x) = \begin{cases} x^2 & \text{if } x < 0 \\ x+1 & \text{if } x \geq 0 \end{cases}$$

x	f(x)
-2	
-1	
0	
1	
2	

2. Determine whether the curve is the graph of a function of x. If it is, state the domain and range of the function.

a.

b.

c.

d.

3. The graph of $y = f(x)$ is given below. Match each equation with its graph.

(a) $y = f(x-4)$

(b) $y = f(x)+3$

(c) $y = \frac{1}{3}f(x)$

(d) $y = -f(x+4)$

(e) $y = 2f(x+6)$

4. Let $f(x) = x^2$ and $g(x) = x+2$.

a. Find $f+g$ and its domain.

b. Find $\frac{f}{g}$ and its domain.

5. Use $f(x) = 3x-5$ and $g(x) = 2-x^2$ to evaluate the expression.

a. $(f \circ g)(-2)$

b. $(g \circ f)(-2)$

6. Let $f(x) = x^2 - 4$, $x \geq 0$; and $g(x) = \sqrt{x+4}$, $x \geq -4$.

Use the Property of Inverse Functions to show that f and g are inverses.

7. Consider the function $f(x) = \frac{1+3x}{5-2x}$.

Find the inverse of f .

8. Let $f(x) = 3 - 5x + 4x^2$.

Find $\frac{f(a+h) - f(a)}{h}$, where $h \neq 0$

9. A tank holds 50 gallons of water, which drains from a leak at the bottom, causing the tank to empty in 20 minutes. The tank drains faster when it is nearly full because the pressure on the leak is greater. Torricelli's Law gives the volume of water remaining in the tank after t minutes as

$$V(t) = 50 \left(1 - \frac{t}{20}\right)^2 \quad 0 \leq t \leq 20$$

a. Find $V(0)$ and $V(20)$

b. What do your answers to part (a) represent?

10. Sketch the graph of the piecewise defined function given by

$$f(x) = \begin{cases} 3 & \text{if } x < 2 \\ x-1 & \text{if } x \geq 2 \end{cases}$$