U1 L4 Functions — Practice

Name: _____ HR: _____

Group A — Testing for Functions

Determine whether each relation represents y as a function of x. If an equation, solve for y first if needed.

1. Does this table represent y as a function of x?

Input, x	10	7	4	7	10
Output, y	3	6	9	12	15

No, (7,6) & (7,12) 1 input 2 different outputs

2. $-5x + y^2 = 4$

$+5x \quad +5x$

$y^2 = 5x + 4$

$y = \pm\sqrt{5x+4}$

Not a function

1 input

$x = 0$

$y = \pm 2$

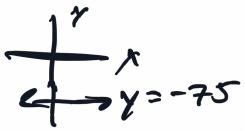
2 diff. outputs

3. $y = \sqrt{16 - x^2}$

yes- each x will map to 1 y-value

4. $y = -75$

yes-



Group B — Function Notation & Evaluating

Find each function value. Show your substitution.

5. f(x) = 2x² − 3x + 1. Find f(0), f(−2), and f(3).

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

$= 1$

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

$= 8 + 6 + 1$

$= 15$

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

$= 18 - 9 + 1$

$= 9 + 1 = 10$

6. $g(x) = \sqrt{x+4}$ Find g(0), g(5), and g(−4).

$g(0) = \sqrt{0+4} = \sqrt{4} = 2$

$g(5) = \sqrt{5+4} = \sqrt{9} = 3$

$g(-4) = \sqrt{-4+4} = \sqrt{0} = 0$

7. h(x) = |x − 3|. Find h(−2), h(3), and h(10).

$h(-2) = |-2-3| = |-5| = 5$

$h(3) = |3-3| = |0| = 0$

$h(10) = |10-3| = |7| = 7$

8. $f(x) = \dfrac{x+1}{x-2}$. Find f(0) and f(4). Then explain why f(2) is undefined.

$f(0) = \dfrac{0+1}{0-2} = \dfrac{1}{-2} = -.5$

$f(4) = \dfrac{4+1}{4-2} = \dfrac{5}{2} = 2.5$

f(2) is undefined because it will cause the denominator x − 2 to become zero.

Group C — Finding the Domain

Find the domain of each function.

9. $f(x) = \sqrt{x-3}$

$x - 3 \geq 0$

$x \geq 3$

Domain: $x \geq 3$ (inequality) or $[3, \infty)$ (Interval)

10. $f(x) = \dfrac{1}{x+5}$

$x + 5 \neq 0$

$x \neq -5$

Domain: $\mathbb{R}, x \neq -5$ or $(-\infty, -5) \cup (-5, \infty)$

11. $f(x) = \sqrt{9-x^2}$

$9 - x^2 \geq 0$

$-x^2 \geq -9$

$x^2 \leq 9$

$-3 \leq x \leq 3$

or $[-3, 3]$



12. $f(x) = \dfrac{x}{x^2-16}$

$x^2 - 16 \neq 0$

$(x-4)(x+4) \neq 0$

$x \neq 4$ or $x \neq -4$

$x^2 = 16$

$x = \pm 4$

$x \neq \pm 4$

D: $\mathbb{R}, x \neq -4, 4$

$(-\infty, -4) \cup (-4, 4) \cup (4, \infty)$

Group D — The Difference Quotient

Find and simplify [f(x + h) − f(x)] / h for each function.

$\dfrac{f(x+h)-f(x)}{h}, h \neq 0$

13. f(x) = x² + 3x

$\dfrac{f(x+h)-f(x)}{h} = \dfrac{(x+h)^2 + 3(x+h) - (x^2+3x)}{h}$

$= \dfrac{x^2 + 2hx + h^2 + 3x + 3h - x^2 - 3x}{h}$

$= 2x + h + 3 = 2x + 3 + h$

14. f(x) = 2x² + 3x − 1

$\dfrac{f(x+h)-f(x)}{h} = \dfrac{2(x+h)^2 + 3(x+h) - 1 - (2x^2+3x-1)}{h}$

$= \dfrac{2(x^2+2hx+h^2) + 3x + 3h - 1 - 2x^2 - 3x + 1}{h}$

$= \dfrac{2x^2 + 4hx + 2h^2 + 3x + 3h - 1 - 2x^2 - 3x + 1}{h}$

$= 4x + 2h + 3 = 4x + 3 + 2h$

Group E — Mixed Applications

Show your work.

15. The height (in feet) of a ball t seconds after being thrown is modeled by h(t) = −16t² + 40t + 5.

Find the height of the ball after 1 second.

$h(1) = -16(1)^2 + 40(1) + 5$

$= -16 + 40 + 5$

$= 24 + 5 = 29$ feet

Determine the time it takes the ball to reach the ground. (Solve h(t)=0.)

$-16t^2 + 40t + 5 = 0$

$16t^2 - 40t - 5 = 0$

$= \dfrac{40 \pm \sqrt{(-40)^2 - 4(16)(-5)}}{2(16)} = \dfrac{40 \pm 43.8}{32}$

$= \dfrac{83.82}{32} = 2.62s$

16. The area of a circle with radius r is given by A(r) = πr². Mathematically, the domain of A is all real numbers. Explain why a smaller domain makes sense for this real-life context, and state that domain.

$A(r) = \pi r^2$

Area of a circle only makes sense if r, the radius is positive.

Domain:

$r > 0$