

1. Find the domain

$$f(x) = \sqrt{36 - x^2} .$$

2. Find the domain

$$g(x) = \frac{1}{x^2 + 7x + 12} .$$

3. Find the domain

$$h(x) = \sqrt{4 + 5x} .$$

4. Find the domain

$$f(x) = \frac{x^2 - 25}{x - 5} .$$

5. Find an equation of the line through the pair of points $(-2, 1)$ and $(-4, -2)$ in slope-intercept form (No decimals).

6. Find the slope and the y -intercept of the following line

$$\frac{-4x - 7}{12} = \frac{4y - 2}{3} .$$

7. Let $f(x) = \begin{cases} x + 1, & \text{if } x < -1; \\ 3x - 1, & \text{if } x \geq -1. \end{cases}$

(a) Find $f(-1)$.

(b) Find $\lim_{x \rightarrow -1^-} f(x)$.

(c) Find $\lim_{x \rightarrow -1^+} f(x)$.

(d) Find $\lim_{x \rightarrow -1} f(x)$.

(e) Is $f(x)$ continuous at $x = -1$? Explain clearly.

8. Find the exact limit (No decimals). $\lim_{x \rightarrow -6} \left(\frac{x^2 - 36}{x + 6} \right)$

9. Find the exact limit (No decimals). $\lim_{x \rightarrow -3} \left(\frac{x - 2}{x^2 + x - 12} \right)$

10. Find the exact limit (No decimals). $\lim_{x \rightarrow -2} \left(4 - \sqrt{x^2 - 4x + 4} \right)$

11. Given $f(x) = x^2 - 5x$, find $f'(4)$ by using the limit definition of the derivative by completing the following three steps:

(a) Simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$.

- (b) Determine the derivative by taking the limit of the simplified difference quotient

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} . \text{ Use your result in part a).}$$

(c) Find $f'(4)$.

12. A college student decides to mow lawns in the summer. The initial cost of the lawn mower is \$300. Gasoline and maintenance costs are \$1.50 per lawn. The student charges \$10 to mow a lawn.

Simplify all functions.

(a) Formulate a function $C(x)$ for the total cost of mowing x lawns.

(b) Formulate a function $R(x)$ for the total revenue of mowing x lawns.

(c) Formulate a function $P(x)$ for the total profit of mowing x lawns.

(d) How many lawns must the college student mow in order to break even ?