

## Practice Test 1

1. Find the domain of:

$$f(x) = \frac{3 - 2x}{x^2 - 25}.$$

2. Sketch the graph of

$$f(x) = \begin{cases} \frac{x^2 - 1}{x + 1} & x \neq -1 \\ -2 & x = -1 \end{cases}.$$

3. Find  $f \circ g(x)$  if  $f(x) = x^2 + 2x - 5$ , and  $g(x) = x - 3$ .

4. Find functions  $f(x)$  and  $g(x)$  such that

$$f \circ g(x) = \sqrt{3x - 5}.$$

5. A company has a fixed cost of \$30,000 and a production cost of \$6 for each unit it manufactures. A unit sells for \$10. Find the cost, revenue and profit functions.

6. Find the following limits:

a.  $\lim_{x \rightarrow 2} \frac{x^2 - x - 2}{x - 2}$

b.  $\lim_{x \rightarrow -\infty} \frac{3x^3 - x + 6}{5x^4 - 2x^2}$

c.  $\lim_{x \rightarrow 9} \frac{x - 9}{\sqrt{x} - 3}$

d.  $\lim_{x \rightarrow 1^+} \frac{x - 1}{x^2 - x}$

e.  $\lim_{x \rightarrow 2^-} \frac{-4}{x - 2}$

7. Find all discontinuities of

$$f(x) = \begin{cases} x - 4 & x \neq 2 \\ -2 & x = 2 \end{cases}.$$

8. Use the definition of the derivative to find an equation of the tangent line to

$$f(x) = x^2 - 5x \text{ at } (-1, 6)$$

9. Find  $f'(x)$  if :

a.  $f(x) = \frac{2}{5x^3} - 4\sqrt{x} + 19x^{\frac{2}{5}}$

b.  $f(x) = (2x^4 - x)\left(\sqrt{x} - \frac{3}{x^2}\right)$

c.  $f(x) = \frac{2x^3 - \sqrt{x} + 1}{x^2 - 4x}$

d.  $f(x) = \sqrt[3]{4x^2 + 5x}$

e.  $f(x) = (x + 3)^5 \sqrt{7x^3 - 4x}$

10. Find an equation of the tangent line to the graph of

$$f(x) = \frac{x+1}{x^2+1} \text{ at } (1, 1).$$

11. Find the point(s) on the graph of  $f(x) = x^3 - 4x^2$  where the tangent line is horizontal.

12. The total box office receipts for a movie are approximated by

$$T(x) = \frac{120x^2}{x^2 + 4}$$

where  $T(x)$  is measured in millions of dollars and  $x$  is the number of years since the movie's release. How fast are the total receipts changing three years after its release?

13. If the cost function is

$$C(x) = 3000 + 2x$$

find the average cost function and the marginal average cost function.