

1. Find $f(g(x))$ if $f(x) = x^2 + 3x$ and $g(x) = 2 - x$.

A. $-x^2 - 3x + 10$

B. $x^2 - x + 4$

C. $x^2 - 7x + 10$

D. $-x^2 - 3x + 2$

E. $x^2 - 3x + 10$

2. Use an appropriate table to estimate

$$\lim_{x \rightarrow 0} \frac{\sqrt{x+1} - 1}{x}$$

A. 0

B. 0.25

C. 1

D. 0.5

E. this limit does not exist

3. $\lim_{x \rightarrow 2} \frac{3x^2 - 2x - 8}{2x^2 + x - 10} =$

A. $\frac{4}{5}$

B. $\frac{3}{2}$

C. $\frac{10}{9}$

D. -2

E. this limit does not exist

4. $\lim_{\Delta x \rightarrow 0} \frac{5(x + \Delta x)^2 - (x + \Delta x) - (5x^2 - x)}{\Delta x} =$

A. $10x + 5\Delta x + 1$

B. $10x + 1$

C. $10x + 5\Delta x - 1$

D. $5\Delta x + 1$

E. $10x - 1$

5. Find y' if $y = x^3 - 4\sqrt{x} + \frac{1}{x^2}$.

A. $y' = 3x^2 - \frac{2}{\sqrt{x}} - \frac{2}{x^3}$

B. $y' = 3x^2 + \frac{1}{\sqrt{x}} - \frac{1}{2x^3}$

C. $y' = 3x^2 + \frac{1}{\sqrt{x}} - \frac{2}{x^3}$

D. $y' = 3x^2 - \frac{2}{\sqrt{x}} - \frac{2}{x}$

E. $y' = 3x^2 - \frac{2}{\sqrt{x}} - \frac{1}{2x^3}$

6. Find y' if $y = (3x^2 + 1)(7 + x - x^2)$.

A. $y' = -6x^3 + 3x^2 - 2x + 1$

B. $y' = -12x^3 + 9x^2 + 40x + 1$

C. $y' = -18x^3 + 9x^2$

D. $y' = -12x^3 + 6x^2 + 40x$

E. $y' = -6x^3 + 40x$

7. Find y' if $y = \frac{4x + 11}{x^2 - 3}$.

A. $y' = \frac{-4x^2 + 22x + 12}{(x^2 - 3)^2}$

B. $y' = \frac{4x^2 + 22x - 12}{(x^2 - 3)^2}$

C. $y' = \frac{-4x^2 - 22x - 12}{(x^2 - 3)^2}$

D. $y' = \frac{4x^2 + 22x + 12}{(x^2 - 3)^2}$

E. $y' = \frac{4x^2 - 22x - 12}{(x^2 - 3)^2}$

8. Find y' if $y = \sqrt{6x^3 - x + 2}$.

A. $y' = \frac{18x^2 - 1}{2\sqrt{6x^3 - x + 2}}$

B. $y' = \frac{-9x^2}{2(6x^3 - x + 2)^{3/2}}$

C. $y' = \frac{1}{2\sqrt{18x^2 - 1}}$

D. $y' = \frac{9x^2}{\sqrt{6x^3 - x + 2}}$

E. $y' = \frac{18x^2 - 1}{2(6x^3 - x + 2)^{3/2}}$

9. Find y' if $y = (1 - \frac{1}{x^2})(3x + 2)$.

A. $y' = \frac{6}{x^3}$

B. $y' = 3 + \frac{3}{x^2} + \frac{4}{x^3}$

C. $y' = 3 + \frac{6}{x^3}$

D. $y' = 3x - \frac{3}{x} + 2 - \frac{2}{x^2}$

E. $y' = 3 + \frac{3}{x^2} - \frac{1}{x}$

10. Find the slope of the line tangent to the graph of $f(x) = 2x^2(5x^2 - 3x + 4)$ at the point $(-1, 24)$.

A. -42

B. -26

C. 52

D. -66

E. -74

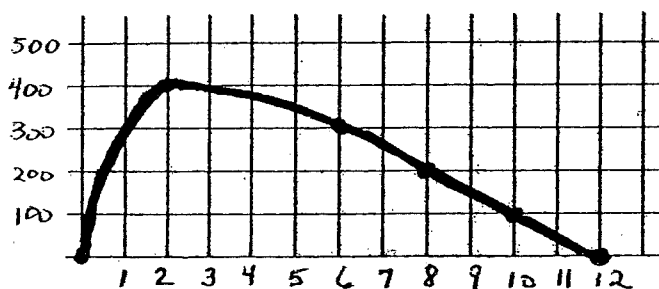
11. Find the x -values of the points on the graph of f where the tangent line is horizontal:

$$f(x) = x(x + 3)^2$$

- A. $x = -3, x = 0$
- B. $x = 1, x = 3$
- C. $x = 3, x = 13$
- D. $x = -3, x = -1$
- E. $x = -13, x = -3$

12. Estimate the average rate of change of the function graphed below, over the interval $[2, 10]$.

- A. $-\frac{1}{4}$
- B. $\frac{125}{2}$
- C. -2
- D. $\frac{3}{2}$
- E. $-\frac{75}{2}$



13. After x milligrams of a particular drug are administered, the change in a patient's body temperature is given by $T(x) = x^2(1 - \frac{x}{9})$. Find the rate at which the body temperature is changing when 4 milligrams are administered.
- A. $\frac{8}{3}$ degrees per mg
 - B. $\frac{40}{9}$ degrees per mg
 - C. $\frac{26}{9}$ degrees per mg
 - D. $\frac{80}{9}$ degrees per mg
 - E. $\frac{1}{3}$ degree per mg
14. A manufacturer's total monthly cost is $C(x) = 0.005x^3 + 0.1x^2 + 65$ dollars, when x units are produced. Find the marginal cost when $x = 34$.
- A. \$24.14
 - B. \$25.10
 - C. \$24.76
 - D. \$25.38
 - E. \$24.43