

1) Find the average rate of change of $y = x^2 + x$ between $x = 4$ and $x = 12$

- (a) 9
- (b) 10
- (c) 17
- (d) 25

2) Find the derivative of: $y = \frac{x^2}{\ln 3x}$

- (a) $\frac{2x^2}{(\ln 3x)^2}$
- (b) $\frac{6x \ln 3x - x}{3(\ln 3x)^2}$
- (c) $\frac{2x \ln 3x - x}{(\ln 3x)^2}$
- (d) $\frac{6x \ln 3x + x}{3(\ln 3x)^2}$

3) Find the coordinates of all inflection points of the function $g(x) = x^3 - 3x^2$

- (a) (-1, -4)
- (b) (0, 0)
- (c) (1, -2)
- (d) (6, 108)

4) Find the derivative of $y = (x^2 + 1)^5$

- (a) $5(x^2 + 1)^4$
- (b) $\frac{1}{6}(x^2 + 1)^6$
- (c) $10x(x^2 + 1)^4$
- (d) $(10x^3 + 10x)^4$

5) Find the limit: $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$

- (a) 0
- (b) 4
- (c) undefined
- (d) 2

6) Determine the elasticity of demand $E(p)$ given the demand function $d(p) = \frac{80}{p^4}$ at price \$15

- a) 1
- b) 1/15
- c) 15/80
- d) 4

7) Determine the absolute extrema of $g(x) = \sqrt[3]{x^2 - 1}$ on $[0, 3]$

- a) absolute minimum at $(0, -1)$ absolute maximum at $(2, \sqrt[3]{3})$
- b) absolute minimum at $(1, 0)$ absolute maximum at $(3, 2)$
- c) absolute minimum at $(0, -1)$ absolute maximum at $(3, 2)$
- d) absolute minimum at $(0, -1)$ & $(1, -1)$ absolute maximum at $(2, \sqrt[3]{3})$

8) Find $f(x)$ given $f'(x) = -3$ and $f(0) = 5$

- a) $f(x) = 5x - 3$
- b) $f(x) = -3x + 5$
- c) $f(x) = -3x$
- d) $f(x) = -3x - 5$

9) Evaluate: $\int_1^6 \frac{4}{x} dx$

- a) 3.33
- b) 1.94
- c) 7.17
- d) 70

10) Determine $f_y(x, y)$ given $f(x, y) = 3x^3 - 4x^2y + 3y^3 + 7$

- a) $9x^2 - 4y$
- b) $9x^2 - 8xy + 3y^3$
- c) $3x^3 - 4x^2 + 9y^2$
- d) $-4x^2 + 9y^2$

11) Determine the slope of the tangent line to the graph of $f(x) = -2.5x^2 + 1.5x - 7.5$ at $x = -1$

- a) - 11.5
- b) 6.5
- c) - 3.5
- d) - 5

12) Determine $f'(x)$ given $f(x) = \frac{1}{5x-4}$

- a) $\frac{-1}{(5x-4)^2}$
- b) $\frac{-5}{(5x-4)^2}$
- c) $5(5x-4)$
- d) $\frac{-1}{(5x-4)^2} + 5$

13) Determine the derivative of $f(x) = \frac{e^{1+2x}}{e^{1-2x}}$

- a) $-4e^{-4x}$
- b) 0
- c) $4e^{4x}$
- d) $\frac{4}{(e^{1-2x})^2}$

14) Find the critical values of $y = 2x^3 + 9x^2 - 60x + 35$

- a) -5 , 2
- b) -8 , 3
- c) -2 , 5
- d) none

15) Locate any relative extrema, if they exist, for $y = \frac{1}{3}x^3 - x^2 - 24x + 40$

- a) relative minimum at (-6 , -68) relative maximum at (4 , 98.67)
- b) relative maximum at (-6 , -68) relative minimum at (4 , 98.67)
- c) relative minimum at (-4 , 98.67) relative maximum at (6 , -68)
- d) relative maximum at (-4 , 98.67) relative minimum at (6 , -68)