



Subject: Calculus

Chapter: Unit 1 & 2

Category: Assignment 1

1. Evaluate the following limit.

$$\frac{2(-3+h)^2 - 18}{h}$$

2. Determine if the following function is continuous or discontinuous at (a) $x = 4$, (b) $x = 6$?

$$g(x) = \begin{cases} 2x & x < 6 \\ x - 1 & x \geq 6 \end{cases}$$

3. Solve the following limit:

$$\frac{x-9}{3-\sqrt{x}}$$

4. Determine if the following function is continuous or discontinuous at

(a) $x = -1$, (b) $x = 0$, (c) $x = 3$?

$$f(x) = \frac{4x+5}{9-3x}$$

5. Evaluate each of the following limits.

$$\frac{6e^{4x} - e^{-2x}}{8e^{4x} - e^{2x} + 3e^{-x}}$$

6. Given the function,

$$g(y) = \begin{cases} y^2 + 5 & \text{if } y < -2 \\ 1 - 3y & \text{if } y \geq -2 \end{cases}$$

Compute the following limits.

(a) $g(y)$

(b) $g(y)$

7. Use the Product Rule to find the derivative of;

$$f(t) = (4t^2 - t)(t^3 - 8t^2 + 12)$$

8. Use the Quotient Rule to find the derivative of;

$$R(w) = \frac{3w + w^4}{2w^2 + 1}$$

9. Differentiate; $f(x) = 2e^x - 8^x$

10. Differentiate; $y = z^5 - e^z \ln(z)$

11. Using chain rule Differentiate the following;

a) $f(x) = (6x^2 + 7x)^4$

b) $f(t) = 5 + e^{4t+t^7}$

12. Determine the second derivative of

a) $z = \ln(7 - x^3)$

b) $Q(v) = \frac{2}{(6+2v-v^2)^4}$

c) $f(t) = \ln(1 + t^2)$

13. For $f(x) = 5x^3 + 2x^2 - 3x$; analyse the concavity.

14. Find the maximum and minimum value of the function

$$x^3 - 3x^2 - 9x + 12$$

15. Find the maximum and minimum value of the function

$$4x^3 - 18x^2 + 24x - 7$$

16. Sketch the curve for the following function;

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

17. Sketch a detailed graph for the following function.

$$f(x) = 3x^2 - 6x$$

18. If $f(x^2 - 1) = x^4 - 7x^2 + k_1$ and $f(x^3 - 2) = x^6 - 9x^3 + k_2$ then the value of $(k_2 - k_1)$ is

19. Which of the following is not an odd function?

A. $f(x) = -x^3$

B. $f(x) = x^5$

C. $f(x) = x^2 - x$

D. $f(x) = |x|^3$

20. If $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = x^2 - 3x + 2$, find $f(f(x))$.