Gandaki University

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Bachelor of Information Technology

BSM 101

Exercise 2

Derivative

1. Find the dervatives of the following functon by definition approach :
   (a) $Q(t) = 1 - 12t$
   (b) $f(x) = \sqrt{z^2 + 3}$
   (c) $V(t) = 6t - t^2$
   (d) $g(z) = 1 + 10z - 7z^2$
   (e) $f(x) = 5x - x^3$

2. Find $\frac{dy}{dx}$ of the following functions.
   a) $y = 5x^7 - 3\sqrt{x} + 1$
   b) $y = \frac{5}{x^2} + x^{3/2} + \frac{1}{2\sqrt{x}} + \frac{x^4}{4} + 8x + \frac{x+3}{7}$
   c) y=$\left(x^2 + 5\right)(2 - 7x)$
   d) $y = \frac{2x^2 - 3}{5x^2 + 4}$
   e) $y = \left(3x^2 + 5\right)^{2/3}$
   f) $y = (2x + 4)^{3/2}(5 - 3x)$
   g) $y = \frac{x}{\sqrt{x^2+1}}$

3. Find $\frac{dy}{dx}$ from the following
   a) $y = \left(u^2 + 5\right)^2$ and $u = x^2 + 3$
   b) $y = z^3 + 2z + 1$ and $z = x^2 + 2$
   c) $y = \frac{t-2}{3t}$ and $t = \sqrt{x+1}$
   d) $y = \sqrt{x^2 + 1}$ and $x = \sqrt{t^2 + 1}$
   e) $y = \ln(5u - 3)$ and $u = 4x^3 - 3x^2$

4. By implicit differentiation find $\frac{dy}{dx}$
   (a) $y^2 - 12x^3 = 8y$
   (b) $y^7 + x^{10} = y^{-2} - 6x^3 + 2$
   (c) $y^{-3} + 4x^{-1} = 8y^{-1}$

(d) $10x^4 - y^{-6} = 7y^3 + 4x^{-3}$

(e) $y^2\left(4 - x^2\right) = y^7 + 9x$

(f) $8xy + 2x^4y^{-3} = x^3$

(g) $x^2 + \sqrt{x^3 + 2y} = y^2$

(h) $\dfrac{x}{y^3} = 1$