Iqra University IU

Islamabad Campus

Calculus & Analytic Geometry

Assignment no. 2

1. Find the derivative of $\mathbf{f(x) = (2x + 1)^{1/2}}$ by first principle and then find the tangent line to the graph of y = f(x) at x = 4.

2. Find the derivative of **y = cos2x** by definition.

3. Find all values of 'x' at which the tangent line to the given curve satisfied the stated property.

$$y = (x + 3)/(x + 2);\quad \text{perpendicular to the line } y = x.$$

4. (a) Find f'(x) if $f(x) = (2x + 1)(1 + 1/x)(x^{-3} + 7)$.

(b) Differentiate $(x^2 + 1)/(x^2 - 1)$ w.r.t. x^3.

5. Find y' if $y = [x^4 - \sec(4x^2 - 2)]^{-4}$

6. Use implicit differentiation to find d^2y/dx^2 at (0, -1), if $xy + y^2 = 1$.

7. Find dy/dx if,

(a) $y = x^2(\sin^{-1}x)^3$ (b) $y = (1/a)\sin^{-1}(a/x)$

8. Use implicit differentiation to find the slope of the tangent line to the curve (lemniscate) at the specified point.

$$2(x^2 + y^2)^2 = 25(x^2 - y^2),\quad (3,1)$$

9. Verify that the given point is on the curve and find the lines that are

(a) Tangent and (b) Normal to the curve at the given point.

$$x \sin 2y = y \cos 2x,\quad (\pi/4, \pi/2)$$

10. The position of a particle moving along a co-ordinate line is $s = \sqrt{1 + 4t}$, with s in meters and t in seconds. Find the particle's velocity, acceleration & Jerk at t = 6s.

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