

NAME: Ayodele Miqdad Temitope

DSFI: M885

Serial NO: 858

MATRIC NO: 19/mksol/110

① $y = 2x^2$ (1, 2)

$$\frac{dy}{dx} = 4x$$

$$m = 4$$

equation for tangent: $y - y_1 = m(x - x_1)$

$$x = 1, y = 2$$

$$y - 2 = 4(x - 1)$$

$$y - 2 = 4x - 4$$

$$4x - y = -2 + 4$$

$$4x - y = 2$$

$$2x = y \quad 4x - y = 2 \quad \text{or} \quad 4x - y - 2 = 0$$

equation of a tangent: $2x = y$

equation for a normal = $y - y_1 = \frac{1}{m}(x - x_1)$

$$y - 2 = \frac{1}{4}(x - 1)$$

$$y - 2 \times \frac{(x - 1)}{2}$$

$$4(y - 2) = x - 1$$

$$4y - 8 = x - 1$$

$$4y - x = 8 - 1$$

$$4y - x = 7$$

$$\text{or} \\ 4y - x - 7 = 0$$

② $y = 3x^2 - 2x$ (2, 8)

$$\frac{dy}{dx} = 6x - 2$$

$$m = \frac{dy}{dx} \Big|_{x=2}$$

$$m = 6(2) - 2$$

$$m = 10$$

eqn of a tangent: $y - y_1 = m(x - x_1)$

$$y - 8 = 10(x - 2)$$

$$y - 8 = 10x - 20$$

$$10x - y = 20 - 8$$

$$10x - y = 12$$

eqn of a normal = $y - y_1 = \frac{1}{m}(x - x_1)$

$$y - 8 \times \frac{1}{10}(x - 2)$$

$$10(y - 8) = x - 2$$

$$10y - 80 = x - 2$$

$$10y - x = 80 - 2$$

$$10y - x = 78$$

③ $y = \frac{x^3}{2} \quad (-1, -\frac{1}{2})$

$$\frac{dy}{dx} = \frac{3x^2}{2}$$

$$m = \frac{3}{2}$$

$$x = -1, \quad y = -\frac{1}{2}$$

eqn of a tangent: $y - y_1 = m(x - x_1)$

$$y - (-\frac{1}{2}) = m(x - (-1))$$

$$y + \frac{1}{2} \times \frac{3(x+1)}{2}$$

$$2(y + \frac{1}{2}) = 3(x+1)$$

$$2y + 1 = 3x + 3$$

$$3x - 2y = 1 - 3$$

$$3x - 2y = -2$$

$$~~3x - 2y~~ \quad 3x - 2y = -2$$

eqn of a normal: $y - y_1 = \frac{1}{m}(x - x_1)$

$$y - (-\frac{1}{2}) = \frac{2}{3}(x - (-1))$$

$$y + \frac{1}{2} \times \frac{2(x+1)}{3}$$

$$2(x+1) = 3(y + \frac{1}{2})$$

$$2x + 2 = 3y + \frac{3}{2}$$

$$~~2x - 3y = -\frac{1}{2}~~$$

$$3y - 2x = 2 - \frac{3}{2}$$

$$3y - 2x = \frac{1}{2}$$

④ $y = 1 + x - x^2 \quad (-2, -5)$

$$\frac{dy}{dx} = 1 - 2x$$

$$m = 5$$

$$x = -2 \quad y = -5$$

eqn of a tangent: $y - y_1 = m(x - x_1)$

$$y - (-5) = 5(x - (-2))$$

$$y + 5 = 5(x + 2)$$

$$y + 5 = 5x + 10$$

$$5x - y - 5 = 10 - 5$$

$$y - 5x = 5$$

eqn of a normal: $y - y_1 = \frac{1}{m}(x - x_1)$

$$y - (-5) = \frac{1}{5}(x - (-2))$$

$$y + 5 \times \frac{1}{5}(x + 2)$$

$$5(y + 5) = x + 2$$

$$5y + 25 = x + 2$$

$$x - 5y = 25 - 2$$

$$x - 5y = 23$$

③ Q5) $y = \frac{1}{x} \quad (3, \frac{1}{3})$

$$m \cdot \frac{dy}{dx} = -\frac{1}{x^2}$$

$$m = -\frac{1}{9}$$

Eqn for tangent: $y - y_1 = m(x - x_1)$

$$y - \frac{1}{3} = -\frac{1}{9}(x - 3)$$

$$9y - 3 = -x + 3$$

$$9y + x - 6 = 0$$

Eqn for normal: $y - y_1 = \frac{1}{m}(x - x_1)$

$$y - \frac{1}{3} = 9x - 18$$

$$y - 9x + \frac{53}{3} = 0$$