

Maths ass

NAME: ACHUSI CHIKODILI YOUNG

MATRIC NO: 19 / MHS 01 / 015

DEPARTMENT: MBS

COLLEGE: MHS

SERIAL NO: 075

Questions:

For the curves in Problem 1 to 5, at the points given, find (a) The equation of the tangent, and (b) the equation of the normal

1. $y = 2x^2$ at the point $(1, 2)$
2. $y = 3x^2 - 2x$ at the point $(-1, -1/2)$ ~~to~~ $(2, 8)$
3. $y = x^{3/2}$ at the point $(-1, -1/2)$
4. $y = 1 + x - x^2$ at the point $(-2, -5)$
5. $y = 1/x$ at the point $(5, 1/5)$

1.) $y = 2x^2$ at the point $(1, 2)$

$$M = \frac{dy}{dx} \Big|_{x=1}$$

$$M = \frac{dy}{dx} \Big|_{x=1} = (2x^2)$$

$$M = 2(1)^2$$

$$M = 2$$

a) equation of tangent

$$y - y_1 = m(x - x_1)$$

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

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

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

$$y - 2x = 0$$

b) equation of the normal

$$m_1 = -\frac{1}{m} \quad m_1 = -\frac{1}{2}$$

$$y - y_1 = m(x - x_1)$$

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

$$2y - 4 = -x + 1$$

$$2y + x = 1 + 4$$

$$2y + x = 5$$

$$2y + x - 5 = 0$$

2.) $y = 3x^2 - 2x$ at point $(2, 8)$

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

$$M = \frac{dy}{dx} \Big|_{x=2} = (3x^2 - 2)$$

$$M = 3(2)^2 - 2(2)$$

$$M = 12 - 4$$

$$M = 8$$

a) equation of tangent

$$y - y_1 = m(x - x_1)$$

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

$$y - 8 = 8x - 16$$

$$y - 8x = -16 + 8$$

$$y - 8x = -8$$

$$y - 8x + 8 = 0$$

b) equation of the normal

$$m_1 = -\frac{1}{m} \quad m_1 = -\frac{1}{8}$$

$$y - y_1 = m(x - x_1)$$

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

$$8y - 64 = -x + 2$$

$$8y + x = 2 + 64$$

$$8y + x = 66$$

$$8y + x - 66 = 0$$

3. $y = x^{3/2}$ at the point $(-1, -1/2)$

$$M = \frac{dy}{dx} \Big|_{x=-1}$$

$$M = \frac{dy}{dx} \Big|_{x=-1} = (x^{3/2})$$

$$M = (-1)^{3/2}$$

$$M = -1/2$$

a) equation of the tangent.

$$y - y_1 = m(x - x_1)$$

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

$$y + 1/2 = -1/2(x + 1)$$

$$2y + 1 = -x - 1$$

$$2y + x = -1 - 1$$

$$2y + x = -2$$

$$2y + x + 2 = 0$$

b) equation of the normal

$$M_1 = -1/M = M_1 = -1 / (-1/2)$$

$$M_1 = 2$$

$$y - y_1 = m(x - x_1)$$

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

$$y + 1/2 = 2(x + 1)$$

$$y + 1/2 = 2x + 2$$

Multiply through by 2

$$2y + 1 = 4x + 4$$

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

$$2y - 4x - 3 = 0$$

4) $y = 1 + x - x^2$ at the point $(-2, -5)$

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

$$M = \frac{dy}{dx} \Big|_{x=-2} = (1 + x - 2x)$$

$$M = 1 + (-2) - (-2)^2$$

$$M = -5$$

a) equation of the tangent

$$y - y_1 = m(x - x_1)$$

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

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

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

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

$$y + 5x = -15$$

$$y + 5x + 15 = 0$$

b) equation of the normal

$$M_1 = -1/M = M_1 = -1 / -5$$

$$M_1 = 1/5$$

$$y - y_1 = m(x - x_1)$$

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

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

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

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

$$5y - x = -23$$

$$5y - x + 23 = 0$$

$$5y - x + 23 = 0$$

5) $y = 1/x$ at the point $(3, 1/3)$

$$M = \frac{dy}{dx} \Big|_{x=3}$$

$$M = \frac{dy}{dx} \Big|_{x=3} = (-1/x^2)$$

$$M = -1/9$$

a) equation of the tangent

$$y - y_1 = m(x - x_1)$$

$$y - 1/3 = m(x - 3)$$

$$y - 1/3 = -1/9(x - 3)$$

$$3y - 1 = -x + 3$$

$$3y - x = 3 + 1$$

$$3y - x = 4$$

$$3y - x + 2 = 0$$

b) equation of the normal

$$M_1 = -1/M = M_1 = -1 / (-1/9)$$

$$M_1 = 9$$

$$y - y_1 = m(x - x_1)$$

$$y - 1/3 = 9(x - 3)$$

Multiply through by 3

$$3y - 1 = 27x - 27$$

$$3y + 27 = 27x - 27 + 1$$

$$3y + 27 = 27x - 26$$

$$3y + 27 - 27x + 26 = 0$$