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MAT104 ASSIGNMENT

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

1 gradient  $\frac{dy}{dx} = 2x^2 = 4x$

$y = 4x$   
 ~~$m = 4$~~

Since  $x = 1$   $y = 4(1) = 4$

$m = \frac{dy}{dx} \Big|_{x=1} \therefore m = 4$

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

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

$y = 4x - 4 + 2$

$y = 4x - 2 \rightarrow$  Equation of the Tangent

$(y - y_1) = \frac{-1}{m} (x - x_1)$

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

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

$$4y = \underline{-x + 1 + 8}$$

$$~~y = -x~~$$

$$4y = -x + 9$$

$$y = -\frac{1}{4}x + \frac{9}{4} \rightarrow \text{Equation for the Straight Line}$$

2 gradient  $\frac{dy}{dx} = 3x^2 - 2x = 6x - 2$

$$y = 6x - 2$$

$$m = 6 \quad c = -2$$

at  $\frac{dy}{dx} \Big|_{x=2}$  Since  $x=2$   $y = 6(2) - 2 = 10$

$$\therefore m = 10$$

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

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

$$y = 10x + 6 \rightarrow \text{Equation of the Tangent}$$

$$(y - y_1) = -\frac{1}{m}(x - x_1)$$

$$10(y - 10) = -1(x - 2)$$

$$10y - 100 = -x + 2$$

$$10y = -x + 82$$

$$y = -\frac{1}{10}x + \frac{82}{10}$$

→ Equation of the Straight line

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

$$m = \left. \frac{dy}{dx} \right|_{x=-1}$$

$$y = 3(-1)^2 = 3$$

$$\therefore m = 3$$

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

$$y = 3x - 3$$

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

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

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

Equation of a Tangent

$$(y - y_1) = \frac{m}{m} (x - x_1)$$

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

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

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

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

$$y = -\frac{1}{3}x - \frac{1}{6}$$

Equation of a Straight line

$$4 \quad \frac{dy}{dx} = 1 + x - x^2 = 1 - 2x$$

$$\left. \frac{dy}{dx} \right|_{x=-2} = 1 - 2(-2) = 1 + 4 = 5$$

$$\therefore m = 5$$

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

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

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

$$y = 5x - 5$$

Equation of the Tangent

$$(y - y_2) = -\frac{1}{m}(x - x_2)$$

$$10(y + 5) = -1(x + 2)$$

$$10y + 50 = -x - 2$$

$$10y = -x - 48$$

$$10y = -x - 52$$

$$y = -\frac{1}{10}x - \frac{52}{10}$$

Equation of the Straight line

$$5 \quad \frac{dy}{dx} = \frac{1}{x} = \frac{0}{x} = 0$$

Hence

The equation of the Tangent and the equation of the straight line is Non-existent