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19/ENG03/011 Civil Engineering

MAT 102

① Equation of the tangent at $x=1, y=0$
 $x^2 + y^2 - 5x - y + 4 = 0$

$$2x + 2y \frac{dy}{dx} - 5 - \frac{dy}{dx} = 0$$

$$2y \frac{dy}{dx} - \frac{dy}{dx} + 2x - 5 = 0$$

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

$$\frac{dy}{dx} = \frac{5 - 2x}{2y - 1} \quad \text{subst. } x=1, y=0$$

$$\frac{dy}{dx} = \frac{5 - 2(1)}{2(0) - 1} = -3$$

$$\therefore y - y_1 = m(x - x_1)$$
$$y = -3x + 3$$

② Equation of tangent at $x=1, y=0$

$$x^2 + y^2 - 12x - 12y + 47 = 0$$

$$2x + 2y \frac{dy}{dx} - 12 - 12 \frac{dy}{dx} = 0$$

$$(2y - 12) \frac{dy}{dx} = 12 - 2x$$

$$\frac{dy}{dx} = \frac{12 - 2x}{2y - 12} \quad \text{subst. } x=1, y=0$$

$$\frac{dy}{dx} = \frac{12 - 2(1)}{2(0) - 12} = \frac{-5}{6}$$

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

$$y = \frac{-5x}{6} + \frac{5}{6} \Rightarrow \frac{5 - 5x}{6}$$

$$\underline{5y + 5x - 5 = 0}$$

③ Equation of the tangent at $x=1, y=0$

$$x^2 + y^2 - 8x + 14y + 40 = 0$$

$$2x + 2y \frac{dy}{dx} - 8 + 14 \frac{dy}{dx} = 0$$

$$2y \frac{dy}{dx} + 14 \frac{dy}{dx} = 8 - 2x$$

$$(2y + 14) \frac{dy}{dx} = 8 - 2x$$

$$\frac{dy}{dx} = \frac{8 - 2x}{2y + 14} \quad \text{Subst. } x=1, y=0$$

$$\frac{dy}{dx} = \frac{8 - 2(1)}{2(0) + 14} = \frac{6}{14}$$

$$= \frac{2(4 - x)}{2(y + 7)} = \frac{3}{7}$$

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

$$y = \frac{3}{7}(x - 1)$$

$$y = \frac{3x}{7} - \frac{3}{7} \Rightarrow \frac{3x - 3}{7}$$

$$7y = 3x - 3$$

$$\underline{7y - 3x + 3 = 0}$$