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Dept: MBBS

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Solu

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

$$y = 2x^2$$

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

$$m = \frac{dy}{dx}$$

$$x = 1$$

$$m = 4(1)$$

$$m = 4$$

Equation of the tangent

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

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

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

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

$$y - 4x = -2$$

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

Equation of the normal

$$m_2 = -\frac{1}{m_1}$$

$$y - y_1 = -\frac{1}{m_1}(x - x_1)$$

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

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

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

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

$$4y - 9 = -x$$

$$4y + x - 9 = 0$$

② $y = 3x^2 - 2x$ at point $(2, 8)$

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

$$\frac{dy}{dx} \text{ when } x=2 = 6(2) - 2$$

$$= 12 - 2$$

$$m = 10$$

Equation of the tangent

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

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

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

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

$$y - 10x - 8 + 20$$

$$y - 10x + 12 = 0$$

Equation of the normal

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

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

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

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

$$10y + x - 80 - 2 = 0$$

$$10y + x - 82 = 0$$

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

Find normal

$$y = x^{3/2}$$

$\frac{dy}{dx}$ of $\frac{1}{2}x^3$

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

$$m = \frac{dy}{dx} \text{ when } x=1$$

$$= \frac{3}{2}(1)^2,$$

$$m = 3/2$$

The equation of tangent

$$y - y_1 = m(x - x_1)$$
$$(y - (-1/2)) = 3/2(x - (-1))$$
$$(y + 1/2) = 3/2(x + 1)$$

$$2(y + 1/2) = 3(x + 1)$$

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

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

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

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

Equation of normal

$$y - y_1 = -m(x - x_1)$$
$$(y - (-1/2)) = -1/3/2(x - (-1))$$

$$(y + 1/2) = -2/3(x + 1)$$

$$(y + 1/2) = -2/3(x + 1)$$

Multiply both sides by 6

$$6(y + 1/2) = -4(x + 1)$$

$$6y + 3 = -4x - 4$$

$$6y + 4x = -4 - 3$$

$$6y + 4x = -7$$

$$6y + 4x + 7 = 0$$

$y = 1 + x - x^2$ at the point $(-3, -5)$

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

$$dy/dx = 1 - 2x$$

$$\frac{dy}{dx} \text{ at } x = -2 \quad 1 - 2(-2)$$

$$m = \frac{dy}{dx} = 1 + 4$$

$$m = 5$$

Equation of tangent

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

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

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

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

$$y-5 = 5x$$

$$y-5-5x=0$$

$$y-5x-5=0$$

Eqn of the normal

$$y-y_1 = -1/m(x-x_1)$$

$$y-(5) = -1/5(x-(2))$$

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

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

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

$$5y+x+27 = 0$$

$$5y+x+27=0$$

$$5y+x+27=0$$

$$5y+x+27=0$$

⑤ $y = 1/x$ at the point $(3, 1/3)$

for normal

$$y = 1/x$$

$$y = x^{-1}$$

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

$$m = \frac{dy}{dx} \bigg|_{x=3} = -3^{-2}$$

$$= -(3)^{-2}$$

$$= -\frac{1}{3^2} = -\frac{1}{9}$$

Eqn of the tangent

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

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

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

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

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

Eqn of normal

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

$$y - y_3 = -y_9 (x - 3)$$

$$(y - y_3) = -\frac{1}{1} \times \frac{9}{9} (x - 3)$$

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

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

multiply both sides by 3

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

$$3y - 1 = 27x - 81$$

$$3y - 27x = -81 + 1$$

$$3y - 27x = -80$$

$$3y - 27x + 80 = 0$$