

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

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

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

find the gradient at point $x = -2$

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

$$m = 4 + 1$$

$$m = 5$$

Equation of the tangent

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

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

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

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

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

$$y - 5x + 5 - 10 = 0$$

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

- Equation of the tangent = $y - 5x - 5 = 0$

Equation of the normal

$$m_1 \cdot m_2 = -1$$

$$5 \cdot m_2 = -1$$

$$m_2 = -\frac{1}{5}$$

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

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

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

$$5y + 25 = -x - 2 = 0$$

$$5y + x + 25 + 2 = 0$$

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

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

$$y = 2x^2$$

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

Find the gradient at $x = -1$

$$m = 2(-1)$$

$$m = -2$$

$$m = 2$$

Equation of the tangent

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

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

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

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

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

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

$$y - 2x = 0$$

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

Equation of the tangent: $y - 2x - 0 = 0$

Equation of the normal

$$m_1 \cdot m_2 = -1$$

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

$$m_2 = \frac{1}{2}$$

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

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

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

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

$$2y = x - 3$$

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

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

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

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

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

$$y = 3x^2 - 2x \text{ at the point } (3, 8)$$

$$\frac{dy}{dx} = 3x^2 - 2x = 9x - 2$$

Find the gradient at $x = 3$

$$m = 9x - 2$$

$$m = 9(3) - 2$$

$$m = 18 - 2 = 16$$

$$m = 16$$

Equation of a tangent

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

$$y - 8 = 16(x - 3)$$

$$y - 8 = 16x - 48$$

$$y - 16x + 48 - 48 = 0$$

$$y - 16x + 48 = 0$$

$$y - 16x + 48 = 0$$

Equation of the tangent: $y - 16x + 48 = 0$

Equation of the normal

$$m_1 \cdot m_2 = -1$$

$$16 \cdot m_2 = -1$$

$$m_2 = -\frac{1}{16}$$

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$$m_2 = -\frac{1}{16}$$

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

$$y - 8 = -\frac{1}{16}(x - 3)$$

$$16y - 128 = -x + 3$$

$$16y + x - 130 = 0$$

$$16y + x - 130 = 0$$

$$16y + x - 130 = 0$$

$$16y + x - 130 = 0$$

$$16y + x - 130 = 0$$

$$16y + x - 130 = 0$$

$$16y + x - 130 = 0$$

$$16y + x - 130 = 0$$

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1.) $y = 2x^2$ point (1,2) -
 $\frac{dy}{dx} = 4x$

Find the gradient at $x=1$

$$\frac{dy}{dx} \bigg|_{x=1} = 4(1) = 4$$

$$m = 4$$

$$x_1 = 1, y_1 = 2$$

Equation of a tangent

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

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

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

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

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

- Equation of tangent = $y - 4x + 2 = 0$

Equation of the normal

$$m_1 \cdot m_2 = -1$$

$$4 \cdot m_2 = -1$$

$$m_2 = \frac{-1}{4}$$

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

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

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

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

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

- Equation of the normal = $4y + x - 7 = 0$