Finding Tangents and Normals

(a) Find the equation of the tangent to the curve $y = x^2 + 2x - 3$ at the point $(1, 0)$.

(b) Find the equation of the tangent to the curve $y = x^2 + 4x - 5$ at the point $(-1, -7)$.

(c) Find the equation of the tangent to the curve $y = x^3 + x$ at the point $(2, 10)$.

(a) $\frac{dy}{dx} = 2x + 2$ $y = 4x - 4$

(b) $\frac{dy}{dx} = 2x + 4$ $y = 2x - 5$

(c) $\frac{dy}{dx} = 3x^2 + 1$ $y = 13x - 16$

(a) Find the equation of the normal to the curve $y = x^2 - 4$ at the point $(1, -3)$.

(b) Find the equation of the normal to the curve $y = x^2 - 5x - 6$ at the point $(3, -12)$.

(c) Find the equation of the normal to the curve $y = 2x^3 - 3x + 1$ at the point $(1, 0)$.

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

(b) $\frac{dy}{dx} = 2x - 5$ $y = -x - 9$

(c) $\frac{dy}{dx} = 6x^2 - 3$ $y = -\frac{1}{3}x + \frac{1}{3}$

(a) Find the equation of the tangent to the curve $y = x^2 + \frac{1}{x}$ at the point where $x = 1$.

(b) Find the equation of the normal to the curve $y = x(x + 2)(x - 1)$ at the point where $x = -2$.

(a) $\frac{dy}{dx} = 2x - \frac{1}{x^2}$ $y = x + 1$

(b) $\frac{dy}{dx} = 3x^2 + 2x - 2$

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

(a) Find the equation of the tangent to the curve $y = 3x - x^2$ at the point $x = 2$.

(b) The tangent crosses the x-axis and y-axis at A and B respectively. Find the area of the triangle AOB.

(a) $\frac{dy}{dx} = 3 - 2x$ $y = -x + 4$

(b) Crosses axes at $(0, 4)$ and $(4, 0)$

Area $= \frac{4 \times 4}{2} = 8$