

Question 1

$$\lim_{x \rightarrow 0} \frac{(x - \cos x)}{x}$$

$$\text{By } \frac{0}{0} = \lim_{x \rightarrow 0} \frac{(1 - (-\sin x))}{1}$$

$$= \lim_{x \rightarrow 0} \frac{(1 + \sin x)}{1} = \frac{(1 + \sin 0)}{1} = \frac{1 + 0}{1} = \frac{1}{1} = 1$$

Question 2

Gradients of  $x^2 + 2xy + y^2 = 1020$

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

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

$$\left( 2x \frac{dy}{dx} \right) + \left( 2y \frac{dy}{dx} \right) = -2x - 2y$$

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

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

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