

Section 3: Implicit differentiation

Solutions to Exercise level 1

$$1. \quad (i) \quad \frac{d}{dx}(y^3) = 3y^2 \frac{dy}{dx}$$

$$(ii) \quad \frac{d}{dx}(\sin y) = \cos y \frac{dy}{dx}$$

$$(iii) \quad \frac{d}{dx}(e^y) = e^y \frac{dy}{dx}$$

$$(iv) \quad \frac{d}{dx}(\ln y) = \frac{1}{y} \frac{dy}{dx}$$

$$2. \quad y^4 + 2xy = x^2$$

Differentiating implicitly: $4y^3 \frac{dy}{dx} + 2x \frac{dy}{dx} + 2y = 2x$

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

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

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