

2nd Maths Paper

1. a) (i) $y = \frac{x^2}{2x+1}$ $u = x^2$ $\frac{du}{dx} = 2x$ $v = 2x+1$ $\frac{dv}{dx} = 2$

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

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

(ii) $y = \sqrt{x^2+1}$ $u = x^2+1$ $\frac{du}{dx} = 2x$ $y = u^{1/2}$ $\frac{dy}{du} = \frac{1}{2}u^{-1/2}$

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

(iii) $y = 3x^{3/2} + 3/x^2 - 6x$ $\frac{dy}{dx} = 9/2 x^{1/2} - 6/x^3 - 6 = 9x^{1/2} - 12/x^3 - 6$ $= 3(3x^{1/2} - 4x^{-3} - 4)$

(iv) $y = \sec^3 4x$ $u = \sec 4x$ $\frac{du}{dx} = 4 \sec 4x \tan 4x$ $\frac{dy}{dx} = 12 \sec^3 4x \tan 4x$

(v) $y = x + \sin 2x$ $\frac{dy}{dx} = 1 + 2 \cos 2x$