

Matrus Exam

Differentiate with respect to x

$$\frac{(u \times v)' - (v \times u')}{v^2}$$

ai

$$y = \frac{x^2}{2x+1}$$

$$u = x^2$$

$$u' = 2x$$

$$v = 2x+1$$

$$v' = 2$$

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

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

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

$$\text{aii } y = \sqrt{x^2+1} = (x^2+1)^{1/2}$$

$$u = x^2+1$$

$$du/dx = 2x$$

$$= \frac{1}{2} u^{-1/2} \times 2x$$

$$y = u^{1/2}$$

$$dy/du = \frac{1}{2} u^{-1/2}$$

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

$$= x(x^2+1)^{-1/2}$$

$$\text{aiii } y = 3x^{3/2} + \frac{3}{x^2} - 6x$$

$$\frac{d}{dx} (3x^{3/2} + \frac{3}{x^2} - 6x)$$

$$= 3 \frac{d}{dx} x^{3/2} - 6 \frac{d}{dx} x + 3 \frac{d}{dx} \frac{1}{x^2}$$

$$= 3 \times \frac{3}{2} x^{3/2-1} - 6 \times 1 + 3(-2)x^{-3} = \frac{9\sqrt{x}}{2} = \frac{6}{x^3} - 6$$