

$$av) \quad y = e^{2x} \tan 3x$$

$\downarrow \quad \quad \downarrow$
u v

ACMA4006
Product rule

$$\frac{du}{dx} = 2e^{2x} \quad \frac{dv}{dx} = 3\sec^2 3x$$

$$\frac{dy}{dx} = (\tan 3x)(2e^{2x}) + (e^{2x})(3\sec^2 3x)$$

$$avi) \quad y = \frac{\sin 5x}{x^3 + 3x + 4}$$

$-u \quad -v$

Quotient rule

$$\frac{du}{dx} = 5\cos 5x \quad \frac{dv}{dx} = 3x^2 + 3$$

$$\frac{dy}{dx} = \frac{(x^3 + 3x + 4)(5\cos 5x) - (\sin 5x)(3x^2 + 3)}{(x^3 + 3x + 4)^2}$$

$$avii) \quad y = \sqrt{3x^3 + 2x + 5}$$

$$y = (3x^3 + 2x + 5)^{\frac{1}{2}}$$

Chain rule

$$\frac{dy}{dx} = 0.5(3x^3 + 2x + 5)^{-\frac{1}{2}} (9x^2 + 2)$$

$$b) \quad y = \sin x \quad 3^{\text{rd}} \text{ derivative}$$

$$\frac{dy}{dx} = \cos x$$

$$\frac{d^2y}{dx^2} = -\sin x$$

$$\frac{d^3y}{dx^3} = -\cos x$$