

11/01/2022

Rhys Higgins

Maths Exam Answer Sheet:

a)

$$(i) \quad y = \frac{x^2}{2x+1} \quad \begin{array}{ll} u = x^2 & u' = 2x \\ v = 2x+1 & v' = 2 \end{array}$$

$$y' = \frac{u'v - v'u}{v^2} = \frac{[2x(2x+1)] - [2(x^2)]}{(4x^2+2x) - (2x^2)} = \frac{2x^2+2x}{4}$$

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

$$(ii) \quad y = \sqrt{x^2+1}$$

$$y = [x^2+1]^{\frac{1}{2}} \quad \frac{d}{dx}(\sqrt{x^2+1}) = \frac{x}{\sqrt{x^2+1}}$$

$$\text{let } u = x^2+1 \quad \frac{dy}{dx} = \left(u^{\frac{1}{2}} \right)' = \frac{1}{2} u^{-\frac{1}{2}} u'$$

$$y' = \frac{u'v + v'u}{v^2} = \frac{1}{2} (x^2+1)^{-\frac{1}{2}}$$

that's quotient rule^x

$$(iii) \quad y = (x + \sin 2x) \quad \begin{array}{l} u = x \\ v = \sin 2x \end{array} \quad \begin{array}{l} u' = 1 \\ v' = \cos 2x \end{array}$$

$$y' = 1 + 2 \cos 2x$$