

Q1) (a)

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

$$\frac{d}{dx} = \left(\frac{x^2}{2x+1} \right)$$

$$\text{Apply quotient rule: } \left(\frac{f}{g} \right)' = \frac{f' \times g - g' \times f}{g^2}$$

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

$$\frac{d}{dx} (x^2) = 2x$$

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

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

$$\text{Expand brackets: } = 4x^2 + 2x$$

$$4x^2 + 2x - 2x^2 = 2x^2 + 2x$$

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