

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

Quotient rule

$$= \frac{g(x)f'(x) - g'(x)f(x)}{g^2}$$

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

$$\begin{aligned} f &= x^2 & f' &= 2x \\ g &= 2x+1 & g' &= 2 \end{aligned}$$

$$\frac{f' \cdot g - g' \cdot f}{g^2}$$

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

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

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

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

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

$$Q1 \text{ iv) } y = \sec^3 4x$$

$$y' = 3 \tan^3 4 = 4 \times 3 = 12 \tan^3$$

$$Q2 \text{ i) } \int \frac{2x}{(4+3x^2)} dx$$

$$\text{let } u \text{ be } (4+3x^2) \quad \frac{du}{dx} = 6x \quad du = 6x \cdot dx$$
$$dx = \frac{du}{6x}$$

$$= \int \frac{2x}{(4+3x^2)} dx = \int \frac{2x}{u} \cdot \frac{du}{6x}$$

$$= \frac{1}{u} \cdot \frac{du}{3}$$

$$= \frac{1}{(4+3x^2)} \cdot \frac{du}{3}$$

Q1 ii) $y = \sqrt{x^2+1}$ chain rule

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

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

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

$$x^2+1 = 2x$$

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

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

Q1 v) $y = (x + \sin 2x)$

$$x=1 \quad \sin 2x = 2\cos 2x$$

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

$$\text{Q1 vi)} \quad y = \frac{1-10x}{(2x-1)^2}$$

$$f = 1-10x \quad f' = -10$$

$$g = (2x-1)^2 \quad g' = 4$$

$$= \cancel{(1-10x)} \quad f' \cdot g - g' \cdot f$$

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

$$= \frac{(-10)(2x-1)^2 - (4)(1-10x)}{((2x-1)^2)^2}$$

$$= \frac{\overbrace{-20x+10x}^{-10x} - 4 + 40x}{((2x-1)^2)^2} = (2x-1)^3$$

$$= \frac{30x-4}{(2x-1)^3}$$