

Q1) a) (i)  $y = \frac{x^2}{2x+1}$

$u = 2x+1$

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

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

$u = x^2+1$

$y = u^{1/2}$

$\frac{du}{dx} = 2x$

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

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

(iii)  $y = 3x^{3/2} + \frac{3}{x^2} - 6x$

$$\frac{dy}{dx} = \frac{9}{2} x^{1/2} - 6x^{-3} - 6$$

(iv)

$y = \sec^3 4x$

$u = 4x$

$y = \sec^3 u$

$\frac{dy}{du} = 3 \sec^3 u \tan u$

$\frac{du}{dx} = 4$

$3 \sec^3 4x \tan 4x$