

$$c) \text{ Let } y = \ln(\operatorname{cosec} x - \cot x)$$

$$\frac{dy}{dx} = \frac{1}{(\operatorname{cosec} x - \cot x)} \times (-\operatorname{cosec} x \cot x + \operatorname{cosec}^2 x)$$

$$= \frac{-\operatorname{cosec} x \cot x + \operatorname{cosec}^2 x}{\operatorname{cosec} x - \cot x}$$

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

$$u = 3x^2 + 4$$

$$\frac{du}{dx} = 6x$$

$$\frac{du}{dx}$$

$$dx = \frac{du}{6x}$$

$$\int \frac{2x}{u} \cdot \frac{du}{6x}$$

$$\frac{1}{3} \int \frac{1}{u} du$$

$$\frac{1}{3} (\ln u)$$

$$= \frac{\ln u}{3} + C \quad \ln(3x^2 + 4) + C$$