

Q2) (a)

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

Remove constant: $\int a \times f(x) dx = a \times \int f(x) dx$

$$= 2 \times \int \frac{x}{4+3x^2} dx$$

$$= 2 \times \int \frac{1}{6u} du$$

Remove constant: $\int \frac{1}{u} du = \ln|u|$

$$= 2 \times \frac{1}{6} \times \int \frac{1}{u} du$$

use the common integral: $\int \frac{1}{u} du = \ln|u|$

$$= 2 \times \frac{1}{6} \ln|u|$$

substitute $u = 4 + 3x^2$ back in: $= 2 \times \frac{1}{6} \ln|4 + 3x^2|$

simplify: $2 \times \frac{1}{6} \ln|4 + 3x^2| = \frac{1}{3} \ln|4 + 3x^2|$

$$= \frac{1}{3} \ln|4 + 3x^2|$$

$$= \underline{\underline{\frac{1}{3} \ln|4 + 3x^2| + C}}$$