

$$\begin{aligned}
 2. a) (i) \quad & \int \frac{2x}{(4+3x^2)} dx \quad u = 4+3x^2 \\
 & \frac{du}{dx} = 6x \quad dx = \frac{du}{6x} \\
 & = \int \frac{2x}{u} \frac{du}{6x} \\
 & = \frac{1}{3} \int \frac{1}{u} = \frac{1}{3} \ln u \\
 & = \frac{\ln(4+3x^2)}{3} + c
 \end{aligned}$$

$$\begin{aligned}
 (ii) \quad & \int_0^4 e^{1/2x} dx \quad u = e^{1/2x} \\
 & \frac{du}{dx} = \frac{1}{2} e^{1/2x} \quad dx = \frac{du}{\frac{1}{2}} \\
 & \int_0^4 u^{1/2x} 2du \\
 & = \left[2u^{1/2x} \right]_0^4 = \left[2e^{1/2x} \right]_0^4 \\
 & = (14.78 - 2) \\
 & = 12.78
 \end{aligned}$$

$$(iii) \quad \int_0^4 \frac{5x+13}{(2x+1)(x+4)} = \int_0^4 \frac{A}{2x+1} + \frac{B}{x+4}$$

$$5x+13 = A(x+4) + B(2x+1)$$

$$x = -1/2 \quad 5(-1/2) + 13 = 11/2 = 7/2 A \quad A = 3$$

$$x = -4 \quad 5(-4) + 13 = -7 = -7B \quad B = 1$$

$$\int_0^4 \frac{3}{2x+1} + \frac{1}{x+4}$$

$$= \left[3 \ln(2x+1) + \ln(x+4) \right]_0^4$$

$$= 8.67 - \ln 4 = 7.78$$