

Question 3 B

B

i) $\int 4x \cos(3x) dx = 4 \int x \cos(3x) dx$

$$u = x \quad v' = \cos(3x)$$

$$u' = 1 \quad v = \frac{\sin(3x)}{3}$$

$$\int u v' = uv - \int u' v$$

$$\int x \cos(3x) = \frac{x \sin(3x)}{3} - \int \frac{\sin(3x)}{3} dx$$

let $u = 3x$

$$\frac{du}{dx} = 3 \Rightarrow dx = \frac{1}{3} du$$

$$= \frac{1}{9} \int \sin(u) du$$

$$= \frac{1}{9} \cos(u) = -\frac{\cos(3x)}{9}$$

$$\int x \cos(3x) = \frac{x \sin(3x)}{3} - \frac{\cos(3x)}{9}$$

$$= \frac{x \sin(3x)}{3} + \frac{\cos(3x)}{9}$$

bring 4
back

$$4 \int x \cos(3x) dx$$

$$= \frac{4x \sin(3x)}{3} + \frac{4 \cos(3x)}{9} + C$$