

a) Differentiate  $\sin(x^2 + 2x)$  with respect to  $x$ .

$$y = \sin(x^2 + 2x)$$

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

b) Hence find  $\int (x + 1) \cos(x^2 + 2x) dx$

$$\frac{d(\sin(x^2 + 2x))}{dx} = \cos(x^2 + 2x) \times (2x + 2)$$

$$\frac{d(\sin(x^2 + 2x))}{dx} = 2(x + 1) \times \cos(x^2 + 2x) \leftarrow \text{Factorize 2 on the right.}$$

$$\sin(x^2 + 2x) = \int 2(x + 1) \times \cos(x^2 + 2x) dx \leftarrow \text{Integrate both sides}$$

$$2 \int (x + 1) \times \cos(x^2 + 2x) dx = \sin(x^2 + 2x)$$

$$\int (x + 1) \times \cos(x^2 + 2x) dx = \frac{1}{2} \sin(x^2 + 2x) \leftarrow \text{Divide both sides by 2.}$$