Worked Solutions

The Product Rule Q.5

differentiate the function $y = x^2 cos(x)$ using the Product Rule.

The **Product Rule** states that if $y = u(x) \cdot v(x)$,

then:

$$\frac{dy}{dx} = \frac{du}{dx} \cdot v(x) + u(x) \cdot \frac{dv}{dx}$$

let $u(x) = x^2$,   then $\frac{du}{dx} = 2x$

let $v(x) = cos(x)$,   then $\frac{dv}{dx} = - sin(x)$

substituting into the Product Rule equation:

$$\frac{dy}{dx} = 2x \cdot cos(x) + x^2 \cdot (- sin(x))$$

simplifying:

$$\frac{dy}{dx} = 2x\cos(x) - x^2\sin(x)$$

hence,

$$\frac{dy}{dx} = 2x\cos(x) - x^2\sin(x)$$