Worked Solutions

Pure Maths, Differential Calculus, sheet PM-DIFF-PR-01

The Product Rule Q.1

differentiate the function $y = xcos(x)$

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 $u(x) = x$ then $\frac{du}{dx} = 1$

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

substituting into the Product Rule equation(above),

$$\frac{dy}{dx} = 1 \cdot cos(x) + x \cdot (-sin(x))$$

simplifying the expression:

$$\frac{dy}{dx} = cos(x) - xsin(x)$$