Worked Solutions

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

The Product Rule Q.3

find the derivative of the function $y = 3xsin(2x)$

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 $u(x) = 3x$, then $\frac{du}{dx} = 3$.

let $v(x) = sin(2x)$, then $\frac{dv}{dx} = 2cos(2x)$ (using the chain rule).

substituting into the Product Rule equation:

$$\frac{dy}{dx} = 3 \cdot sin(2x) + 3x \cdot 2cos(2x)$$

simplifying the expression:

$$\frac{dy}{dx} = 3sin(2x) + 6xcos(2x)$$