

Worked Solutions

Pure Maths, Differential Calculus,

sheet PM-DIFF-CR-01

The Chain Rule Q. 2

Find the derivative of $y = (5 - 3x)^2$ using the Chain Rule.

- inner function: $u = 5 - 3x$
- outer function: $y = u^2$

differentiate the outer function $y = u^2$

$$\frac{dy}{du} = 2u$$

differentiate the inner function: $u = 5 - 3x$

$$\frac{du}{dx} = -3$$

using the Chain Rule:

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

substituting for $\frac{dy}{du} = 2u$ and $\frac{du}{dx} = -3$

$$\frac{dy}{dx} = 2u \cdot (-3)$$

substituting $u = 5 - 3x$:

$$\frac{dy}{dx} = 2(5 - 3x) \cdot (-3)$$

expanding gives the answer:

$$\frac{dy}{dx} = -6(5 - 3x)$$