

Worked Solutions

Pure Maths, Differential Calculus,

sheet PM-DIFF-CR-01

The Chain Rule Q. 3

We are tasked with finding the derivative of $y = (3x^2 - 4)^2$ using the Chain Rule in the same format as before.

- Inner function: $u = 3x^2 - 4$
 - Outer function: $y = u^2$
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differentiate the outer function, $y = u^2$

differentiate the inner function $u = 3x^2 - 4$

$$\frac{du}{dx} = 6x$$

using the Chain Rule:

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

substituting for $\frac{dy}{du} = 2u$ and $\frac{du}{dx} = 6x$

$$\frac{dy}{dx} = 2u \cdot 6x$$

substituting for $u = 3x^2 - 4$

$$\frac{dy}{dx} = 2(3x^2 - 4) \cdot 6x$$

expanding gives the answer,

$$\frac{dy}{dx} = 12x(3x^2 - 4)$$