Worked Solutions

Trigonometrical Functions Q.3

differentiate the function $y = tan(2x)$

The **Chain Rule** is used when differentiating a 'composite function', which is described as a function of another function.

The derivatives of the functions are linked by the equation:

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

for $y = tan(2x)$,   let u be the inner function, $u = 2x$

then the outer function is $y = tan(u)$

taking derivatives with respect to u and y respectively,

$$\frac{du}{dx} = 2 \qquad \text{and} \qquad \frac{dy}{du} = sec^2(u)$$

substituting these derivatives into the Chain Rule equation,

$$\frac{dy}{dx} = sec^2(u) \cdot 2$$

substituting for $u = 2x$,

$$\frac{dy}{dx} = sec^2(2x) \cdot 2$$

simplifying,

$$\frac{dy}{dx} = 2sec^2(2x)$$