

Chapter 1

Derivative Formulæ

1.1 General Functions

For any two functions u and v :

$$(u + v)' = u' + v'$$

When there is a constant, c :

$$(c \cdot u)' = c \cdot u'$$

1.2 Trigonometric Functions

$$\begin{aligned}\frac{d}{dx} \sin x &= \cos x \\ \frac{d}{dx} \cos x &= -\sin x\end{aligned}$$

1.3 Product Rule

$$(u \cdot v)' = v \cdot u' + u \cdot v' \tag{1.1}$$

Example 1.1. To differentiate $f(x) = x^3 \sin x$, we let $u = x^3$ and $v = \sin x$:

$$\begin{aligned}\therefore u' &= 3x^2 \\ v' &= \cos x\end{aligned}$$

From Equation 1.1, we know:

$$\begin{aligned}f'(x) &= vu' + uv' \\ &= 3x^2 \sin x + x^3 \cos x\end{aligned}$$