

Find the product rule of 3 functions.

Ex : $f(x) = x^2 \sin x \cos x$. Find $f'(x)$.

Define functions u, v, w .

$$\begin{aligned}(uvw)' &= (uv)'w + (uv)w' \\ &= (u'v + uv')w + (uv)w' \\ &= u'vw + uv'w + uvw'\end{aligned}$$

$$f(x) = x^2 \sin x \cos x$$

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