Product rule (AASL/HL)

Intuition Pump: Imagine you are tracking the revenue of a business over time, where revenue (R) is a product of the number of units sold (u) and the price per unit (p), so R = u * p.

Now, let's say you want to find out how this revenue changes over time, which involves finding the derivative of R with respect to time (t). According to the product rule:

1. Compute the rate at which the number of units sold changes (du/dt), which might be due to changes in market demand.
2. Compute the rate at which the price per unit changes (dp/dt), which could change due to inflation, promotions, or other economic factors.
3. The total rate of change of the revenue (dR/dt) would then be the sum of:
   - The change in units sold (du/dt) while keeping the price constant, plus
   - The change in price (dp/dt) while keeping the number of units constant.

Mathematically, this is written as:
   dR/dt = (du/dt) * p + u * (dp/dt)

This formula tells you how small changes in units sold and price per unit independently contribute to the overall change in revenue.