

Learning outcomes

After completing this section, you will inshaAllah be able to

1. know product & quotient rules for differentiation
2. use product & quotient rules to perform differentiation

Differentiating using product rule

- Recall from 3.1: Differentiation is practically carried out with a combination of rules and formulas
- In 3.1 we did “Rules set#1”. Here we learn more rules for differentiation.

Product rule

- $\frac{d}{dx}[f(x) \cdot g(x)] = f'(x) \cdot g(x) + f(x) \cdot g'(x)$
- or in short $(f \cdot g)' = f' \cdot g + f \cdot g'$

See Example 2

How to apply it to product of 3 functions

See examples 1, 2 done in class

Differentiating using quotient rule

Quotient rule

- $\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{g(x) \cdot f'(x) - f(x) \cdot g'(x)}{[g(x)]^2}$
- or in short $\left(\frac{f}{g} \right)' = \frac{g \cdot f' - f \cdot g'}{g^2}$

See examples 3, 4 done in class

Differentiating using both rules simultaneously

See example 5 done in class