

Exercise walk-through

The Product Rule ■ 2.8

eXercise

You must be able to

- differentiate a product with the **product rule** 乘积法则 $(fg)' = f'g + fg'$

Method — The product rule

$$(fg)' = f'g + fg'.$$

Method — Example

$$\frac{d}{dx}[x \sin x] = (1) \sin x + x \cos x = \sin x + x \cos x.$$

Practice 2.1 ■ 1 mark

State the product rule.

Solution 2.1

Method: The product rule

Worked steps

$$(fg)' = f'g + fg' \quad \text{B1}.$$

Practice 2.2 ■ 2 marks

Differentiate $x e^x$.

Solution 2.2

Worked steps

$$(1)e^x + xe^x = e^x(1+x) \quad \text{M1} \quad \text{A1}.$$

Practice 2.3 ■ 1 mark

State when you need the product rule.

Solution 2.3

Method: The product rule

Worked steps

when differentiating a product of two functions of x **B1**.

Exam-style 3.1 ■ 1 mark

$(fg)'$ equals

A $f g'$

B $f'g + fg'$

C $f'g - fg'$

D f/g'

Solution 3.1

A $f'g'$

B $f'g + fg'$



C $f'g - fg'$

D f'/g'

Worked steps

B.

Exam-style 3.2 ■ 1 mark

$\frac{d}{dx}[x^2 \sin x]$ uses the

A power rule only

B product rule

C quotient rule

D chain rule only

Solution 3.2

A power rule only

B product rule 

C quotient rule

D chain rule only

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$$y = x \cos x.$$

- (a) Identify f and g .
- (b) Apply the product rule.
- (c) State y' .

Solution 3.3

Method: The product rule

Worked steps

(a) $f = x$, $g = \cos x$ **B1**. (b) $(1) \cos x + x(-\sin x)$ **B1**. (c) $y' = \cos x - x \sin x$ **B1**.