

Exercise walk-through

The Quotient Rule ■ 2.9

eXercise

You must be able to

- differentiate a quotient with the **quotient rule** 商法则 $\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$

Method — The quotient rule

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}.$$

Method — Example

$$\frac{d}{dx} \left[\frac{x}{x+1} \right] = \frac{(1)(x+1) - x(1)}{(x+1)^2} = \frac{1}{(x+1)^2}.$$

Practice 2.1 ■ 1 mark

State the quotient rule.

Solution 2.1

Method: The quotient rule

Worked steps

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2} \quad \text{B1}.$$

Practice 2.2 ■ 2 marks

Differentiate $\frac{1}{x}$ using the quotient rule.

Solution 2.2

Method: The quotient rule

Worked steps

with $f = 1$, $g = x$: $\frac{(0)(x) - (1)(1)}{x^2} = -\frac{1}{x^2}$ **M1** **A1**.

Practice 2.3 ■ 1 mark

State the denominator of the quotient-rule result.

Solution 2.3

Method: The quotient rule

Worked steps

g^2 (the square of the denominator) **B1**.

Exam-style 3.1 ■ 1 mark

$\left(\frac{f}{g}\right)'$ equals

A $\frac{f'g - fg'}{g^2}$

B $\frac{f'g + fg'}{g^2}$

C $\frac{f'}{g'}$

D $\frac{fg' - f'g}{g^2}$

Solution 3.1

Method: Example

A $\frac{f'g - fg'}{g^2}$



B $\frac{f'g + fg'}{g^2}$

C $\frac{f'}{g'}$

D $\frac{fg' - f'g}{g^2}$

Worked steps

A

Exam-style 3.2 ■ 1 mark

In the quotient rule, the denominator is

A g

B g^2

C f^2

D fg

Solution 3.2

Method: The quotient rule

A g

B g^2



C f^2

D fg

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$$y = \frac{x}{x+2}.$$

- (a) Identify f and g .
- (b) Apply the rule.
- (c) Simplify.

Solution 3.3

Worked steps

(a) $f = x$, $g = x + 2$ **B1**. (b) $\frac{(1)(x+2) - x(1)}{(x+2)^2}$ **B1**. (c) $\frac{2}{(x+2)^2}$ **B1**.