

Exercise walk-through

Determining Intervals on Which a Function Is Increasing or Decreasing ■ 5.3

eXercise

You must be able to

- use the sign of f' to find where f is **increasing** 递增 or **decreasing** 递减

Method — Increasing and decreasing

- f is **increasing** where $f' > 0$;
- f is **decreasing** where $f' < 0$.

Test the sign of f' on the intervals between critical points.

Method — Example

$f'(x) = 2x - 4$: $f' > 0$ for $x > 2$ (increasing) and $f' < 0$ for $x < 2$ (decreasing).

Practice 2.1 ■ 1 mark

State where f is increasing.

Solution 2.1

Method: Increasing and decreasing

Worked steps

where $f' > 0$ **B1**.

Practice 2.2 ■ 2 marks

For $f(x) = 2x - 4$, find where f is increasing.

Solution 2.2

Method: Increasing and decreasing

Worked steps

$$2x - 4 > 0 \Rightarrow x > 2 \quad \text{M1} \quad \text{A1}.$$

Practice 2.3 ■ 1 mark

For the same f' , state where f is decreasing.

Solution 2.3

Method: Increasing and decreasing

Worked steps

$$x < 2 \quad \text{B1}.$$

Exam-style 3.1 ■ 1 mark

f is increasing where

A $f' < 0$

B $f' > 0$

C $f'' > 0$

D $f = 0$

Solution 3.1

Method: Increasing and decreasing

A $f' < 0$

B $f' > 0$ 

C $f' > 0$

D $f = 0$

Worked steps

B.

Exam-style 3.2 ■ 1 mark

If $f(x) = 2x - 4$, then f is decreasing for

A $x > 2$

B $x < 2$

C all x

D $x = 2$

Solution 3.2

A $x > 2$

B $x < 2$



C all x

D $x = 2$

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$$f'(x) = 3x^2 - 3.$$

- (a) Solve $f' = 0$.
- (b) Test a point in $(-1, 1)$.
- (c) State where f is decreasing.

Solution 3.3

Method: Increasing and decreasing

Worked steps

(a) $x = \pm 1$ **B1**. (b) $f'(0) = -3 < 0$ **B1**. (c) $(-1, 1)$ **B1**.