

Exercise walk-through

Using the Candidates Test to Determine Absolute (Global) Extrema ■ 5.5

eXercise

You must be able to

- find the **absolute (global) extrema** 绝对极值 on a closed interval

Method — The Candidates Test

On a closed interval $[a, b]$, evaluate f at **all critical points and both endpoints**. The largest value is the absolute maximum; the smallest is the absolute minimum.

Method — Example

$f(x) = x^2$ on $[-1, 3]$: critical point $x = 0$; candidates $f(-1) = 1$, $f(0) = 0$, $f(3) = 9$;
absolute max 9, absolute min 0.

Practice 2.1 ■ 1 mark

State what to evaluate for absolute extrema on $[a, b]$.

Solution 2.1

Method: The Candidates Test

Worked steps

f at all critical points and the two endpoints **B1**.

Practice 2.2 ■ 2 marks

For $f(x) = x^2$ on $[-1, 3]$, list the candidate inputs.

Solution 2.2

Worked steps

$$x = -1, x = 0, x = 3 \quad \text{M1} \quad \text{A1}.$$

Practice 2.3 ■ 1 mark

State how to pick the absolute maximum.

Solution 2.3

Method: The Candidates Test

Worked steps

the largest of the candidate values **B1**.

Exam-style 3.1 ■ 1 mark

To find absolute extrema on $[a, b]$, evaluate f at

- A** only the endpoints
- B** the critical points and endpoints
- C** only the critical points
- D** $x = 0$

Solution 3.1

Method: The Candidates Test

- A only the endpoints
- B the critical points and endpoints**
- C only the critical points
- D $x = 0$



Worked steps

B.

Exam-style 3.2 ■ 1 mark

The absolute maximum is the

- A** smallest candidate value
- B** largest candidate value
- C** midpoint
- D** average

Solution 3.2

Method: The Candidates Test

A smallest candidate value

B largest candidate value



C midpoint

D average

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$$f(x) = x^2 \text{ on } [-1, 3].$$

- (a) State the critical point.
- (b) Evaluate at the candidates $-1, 0, 3$.
- (c) State the absolute maximum.

Solution 3.3

Method: The Candidates Test

Worked steps

(a) $x = 0$ **B1**. (b) $f(-1) = 1$, $f(0) = 0$, $f(3) = 9$ **B1**. (c) 9 **B1**.