Exercise walk-through

Confirming Continuity over an Interval ▪ 1.12

eXercise

You must be able to

- state what it means for a function to be continuous on an **interval** 区间
- know where standard functions are continuous

Method — Continuity over an interval

f is continuous on an interval if it is continuous at **every** point in it.

- polynomials, exponentials, $\sin$, $\cos$ are continuous **everywhere**;
- a rational function is continuous except where its denominator is 0.

Method — Example

$f(x) = \dfrac{1}{x-3}$ is continuous everywhere except at $x = 3$.

Practice 2.1 ▪ 1 mark

State what continuity over an interval means.

Solution 2.1

Method: Continuity over an interval

Worked steps

it is continuous at every point of the interval B1.

Practice 2.2 ▪ 1 mark

State where a polynomial is continuous.

Solution 2.2

Method: Continuity over an interval

Worked steps

everywhere (for all real x) B1.

Practice 2.3 ▪ 2 marks

State where a rational function may be discontinuous.

Solution 2.3

Method: Continuity over an interval

Worked steps

where its denominator equals 0 B1 B1.

Exam-style 3.1 ▪ 1 mark

A function is continuous on an interval if it is continuous

A at one point

B at every point of the interval

C at the endpoints only

D nowhere

Solution 3.1

Method: Continuity over an interval

A at one point

B at every point of the interval ✓

C at the endpoints only

D nowhere

Worked steps

B.

Exam-style 3.2 ▪ 1 mark

Polynomials are continuous

A nowhere

B everywhere

C only at 0

D only for $x > 0$

Solution 3.2

Method: Continuity over an interval

A nowhere

B everywhere ✓

C only at 0

D only for $x > 0$

Worked steps

B.

Exam-style 3.3 ▪ 1 mark

$f(x) = \dfrac{1}{x-3}$.

(a) Where is it discontinuous?

(b) Is it continuous on $[0, 2]$?

(c) Is it continuous on $[0, 4]$?

Solution 3.3

Worked steps

(a) $x = 3$ B1. (b) yes (3 is not in $[0, 2]$) B1. (c) no (3 is in $[0, 4]$) B1.