

# 1.12 Confirming Continuity over an Interval

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 9 marks

## Objective

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Build the skills to answer exam questions on **confirming continuity over an interval**.

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

## 1 Worked examples

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Study these first. Each one shows the method for a question type used later.

### ■ 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.

### ■ Example

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

## 2 Practice

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2.1 State what continuity over an interval means. [1]

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2.2 State where a polynomial is continuous. [1]

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2.3 State where a rational function may be discontinuous. [2]

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### 3 Exam-style questions

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3.1 A function is continuous on an interval if it is continuous [1]

- **A** at one point
  - **B** at every point of the interval
  - **C** at the endpoints only
  - **D** nowhere
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3.2 Polynomials are continuous [1]

- **A** nowhere
  - **B** everywhere
  - **C** only at 0
  - **D** only for  $x > 0$
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3.3  $f(x) = \frac{1}{x - 3}$ .

- (a) Where is it discontinuous? [1]
- (b) Is it continuous on  $[0, 2]$ ? [1]
- (c) Is it continuous on  $[0, 4]$ ? [1]

### 4 Go further

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- work through the **1.12 Confirming Continuity over an Interval** lesson on the **Learn** page;
- read the **Limits and Continuity** section of the AP Calculus AB handout on the **Know** page.

## Solutions

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**2.1** it is continuous at every point of the interval.

**2.2** everywhere (for all real  $x$ ).

**2.3** where its denominator equals 0.

**3.1** B.

**3.2** B.

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