

1.12 Confirming Continuity over an Interval

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS interval 区间 • continuous on an interval 在区间上连续 • exponential 指数
• continuous 连续 • rational function 有理函数

Objective

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

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

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

2.2 State where a polynomial is continuous. [1]

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

3 Exam-style questions

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

3.2 Polynomials are continuous [1]

- **A** nowhere
- **B** everywhere
- **C** only at 0
- **D** only for $x > 0$

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]

Solutions

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 $[0, 4]$).