

# 1.5 Determining Limits Using Algebraic Properties of Limits

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

Total: 9 marks

**KEY WORDS** continuous 连续 • direct substitution 直接代入 • limit laws 极限律 • limit 极限

## Objective

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Build the skills to answer exam questions on **determining limits using algebraic properties of limits**.

You must be able to:

- apply the **limit laws** 极限律 (sum, product, constant multiple)
- use **direct substitution** 直接代入 for continuous functions

## 1 Worked examples

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

### ■ Limit laws

Limits distribute over sums, differences, products, quotients (denominator  $\neq 0$ ), and constant multiples. For a continuous function,  $\lim_{x \rightarrow a} f(x) = f(a)$  (**direct substitution**).

### ■ Example

$$\lim_{x \rightarrow 3} (x^2 - 1) = 3^2 - 1 = 8.$$

## 2 Practice

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**2.1** State the limit of a sum  $\lim(f + g)$ . [1]

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**2.2** Evaluate  $\lim_{x \rightarrow 2} (3x + 1)$  by substitution. [2]

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**2.3** State when direct substitution works. [1]

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### 3 Exam-style questions

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**3.1**  $\lim(f + g)$  equals [1]

|   |   |
|---|---|
| A | B |
| C | D |

**A**  $\lim f \cdot \lim g$

**B**  $\lim f + \lim g$

**C**  $\lim f - \lim g$

**D**  $f(a)$

**3.2** For a continuous function,  $\lim_{x \rightarrow a} f(x)$  equals [1]

|   |   |
|---|---|
| A | B |
| C | D |

**A** 0

**B**  $f(a)$

**C**  $\infty$

**D**  $a$

**3.3** Evaluate  $\lim_{x \rightarrow 3}(x^2 - 1)$ .

(a) Substitute  $x = 3$ . [1]

(b) Compute  $3^2$ . [1]

(c) State the limit. [1]