AP CALCULUS AB • EXERCISE SHEET

1.7 Selecting Procedures for Determining Limits

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

Objective

Build the skills to answer exam questions on **selecting procedures for determining limits**.

You must be able to:

- choose the right method (substitution, factoring, one-sided) for a limit
- interpret what $\frac{0}{0}$ and $\frac{\text{nonzero}}{0}$ signal

1 Worked examples

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

Choosing a method

- try **direct substitution** first;
- $\frac{0}{0}$ (an **indeterminate form** 未定式) → factor and cancel, or rationalize;
- $\frac{\text{nonzero}}{0}$ → check for a vertical asymptote and use one-sided limits.

Example

$\lim_{x\to 2} \dfrac{x-2}{x^2-4}$: substitution gives $\frac{0}{0}$, so cancel to $\dfrac{1}{x+2} = \frac{1}{4}$.

2 Practice

2.1 State the first method to try. [1]

2.2 State what a $\frac{0}{0}$ result signals. [1]

2.3 State what a $\frac{\text{nonzero}}{0}$ result signals. [1]

3 Exam-style questions

3.1 The first thing to try for a limit is [1]

- **A** factoring
- **B** direct substitution
- **C** rationalizing
- **D** a table

3.2 A $\frac{0}{0}$ form means [1]

- **A** the limit is 0
- **B** more algebra is needed
- **C** the limit is ∞
- **D** no limit exists

3.3 $\lim_{x \to 2} \dfrac{x - 2}{x^2 - 4}$.

(a) Substitute to see the form. [1]

(b) Factor the denominator. [1]

(c) Simplify and evaluate. [1]

4 Go further

- work through the **1.7 Selecting Procedures for Determining Limits** lesson on the **Learn** page;
- read the **Limits and Continuity** section of the AP Calculus AB handout on the **Know** page.

Solutions

2.1 direct substitution.

2.2 that more algebra (factoring/rationalizing) is needed.

2.3 a possible vertical asymptote —check one-sided limits.

3.1 B.

3.2 B.

3.3 (a) $\frac{0}{0}$. (b) $(x-2)(x+2)$. (c) $\dfrac{1}{x+2} = \frac{1}{4}$.