Exercise walk-through

Selecting Procedures for Determining Limits ▪ 1.7

eXercise

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

Method — Choosing a method

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

Method — Example

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

Practice 2.1 ▪ 1 mark

State the first method to try.

Solution 2.1

Method: Choosing a method

Worked steps

direct substitution B1.

Practice 2.2 ▪ 1 mark

State what a $\frac{0}{0}$ result signals.

Solution 2.2

Worked steps

that more algebra (factoring/rationalizing) is needed B1.

Practice 2.3 ▪ 1 mark

State what a $\frac{\text{nonzero}}{0}$ result signals.

Solution 2.3

Method: Choosing a method

Worked steps

a possible vertical asymptote — check one-sided limits B1.

Exam-style 3.1 ▪ 1 mark

The first thing to try for a limit is

A factoring

B direct substitution

C rationalizing

D a table

Solution 3.1

A factoring

B direct substitution ✓

C rationalizing

D a table

Worked steps

B.

Exam-style 3.2 ▪ 1 mark

A $\frac{0}{0}$ form means

A the limit is 0

B more algebra is needed

C the limit is ∞

D no limit exists

Solution 3.2

Method: Choosing a method

A the limit is 0

B more algebra is needed ✓

C the limit is ∞

D no limit exists

Worked steps

B.

Exam-style 3.3 ▪ 1 mark

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

(a) Substitute to see the form.
(b) Factor the denominator.
(c) Simplify and evaluate.

Solution 3.3

Method: Choosing a method

Worked steps

(a) $\frac{0}{0}$ B1. (b) $(x-2)(x+2)$ B1. (c) $\dfrac{1}{x+2} = \frac{1}{4}$ B1.