Exercise walk-through

Removing Discontinuities ▪ 1.13

eXercise

You must be able to

- remove a **removable discontinuity 可去间断点** by redefining f at the hole

Method — Removing a discontinuity

A removable discontinuity (a hole) can be removed by defining $f(a) = \lim_{x \to a} f(x)$.

Method — Example

$f(x) = \dfrac{x^2 - 4}{x - 2}$ has a hole at $x = 2$; since the limit there is 4, setting $f(2) = 4$ makes f continuous.

Practice 2.1 ▪ 1 mark

State how to remove a removable discontinuity.

Solution 2.1

Method: Removing a discontinuity

Worked steps

define $f(a)$ to equal the limit $\lim_{x \to a} f(x)$ B1.

Practice 2.2 ▪ 2 marks

For $f(x) = \dfrac{x^2 - 4}{x - 2}$, find the value that removes the hole at 2.

Solution 2.2

Method: Example

Worked steps

the limit is 4, so set $f(2) = 4$ M1 A1.

Practice 2.3 ▪ 1 mark

State which kind of discontinuity can be removed.

Solution 2.3

Method: Removing a discontinuity

Worked steps

a removable discontinuity (a hole) B1.

Exam-style 3.1 ▪ 1 mark

A removable discontinuity is removed by setting $f(a)$ equal to

A 0

B the limit at a

C $f(a+1)$

D ∞

Solution 3.1

Method: Removing a discontinuity

A 0

B the limit at a ✓

C $f(a+1)$

D ∞

Worked steps

B.

Exam-style 3.2 ▪ 1 mark

Which discontinuity can be removed?

A jump

B infinite

C removable

D none

Solution 3.2

Method: Removing a discontinuity

A jump

B infinite

C removable ✓

D none

Worked steps

C.

Exam-style 3.3 ▪ 1 mark

$f(x) = \dfrac{x^2 - 9}{x - 3}$, with a hole at 3.

(a) Simplify f.

(b) Find the limit at 3.

(c) State $f(3)$ to remove the hole.

Solution 3.3

Method: Example

Worked steps

(a) $x+3$ (for $x \neq 3$) B1. (b) 6 B1. (c) $f(3)=6$ B1.