AP CALCULUS AB • EXERCISE SHEET

1.13 Removing Discontinuities

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

Objective

Build the skills to answer exam questions on **removing discontinuities**.

You must be able to:

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

1 Worked examples

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

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

2 Practice

2.1 State how to remove a removable discontinuity. [1]

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

2.3 State which kind of discontinuity can be removed. [1]

3 Exam-style questions

3.1 A removable discontinuity is removed by setting $f(a)$ equal to [1]

- **A** 0
- **B** the limit at a
- **C** $f(a+1)$
- **D** ∞

3.2 Which discontinuity can be removed? [1]

- **A** jump
- **B** infinite
- **C** removable
- **D** none

3.3 $f(x) = \dfrac{x^2 - 9}{x - 3}$, with a hole at 3.

(a) Simplify f. [1]

(b) Find the limit at 3. [1]

(c) State $f(3)$ to remove the hole. [1]

4 Go further

- work through the **1.13 Removing Discontinuities** lesson on the **Learn** page;
- read the **Limits and Continuity** section of the AP Calculus AB handout on the **Know** page.

Solutions

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

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

2.3 a removable discontinuity (a hole).

3.1 B.

3.2 C.

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