AP CALCULUS AB • EXERCISE SHEET

1.2 Defining Limits and Using Limit Notation

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

KEY WORDS limit notation 极限记号 • arbitrarily 任意地 • limit 极限 • approaches 趋近

Objective

Build the skills to answer exam questions on **defining limits and using limit notation**.

You must be able to:

- read and write **limit notation** 极限记号 $\lim_{x\to a} f(x) = L$
- explain that a limit need not equal $f(a)$

1 Worked examples

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

■ **Limit notation**

$$\lim_{x\to a} f(x) = L$$

means $f(x)$ gets arbitrarily close to L as x approaches a from **both sides** — regardless of the value (or existence) of $f(a)$.

■ **Example**

$f(x) = x + 1$: $\lim_{x\to 2} f(x) = 3$, which here also equals $f(2) = 3$.

2 Practice

2.1 State what $\lim_{x\to a} f(x) = L$ means. [1]

2.2 State whether the limit must equal $f(a)$. [1]

2.3 For $f(x) = 2x$, state $\lim_{x \to 3} f(x)$. [2]

3 Exam-style questions

3.1 $\lim_{x \to a} f(x) = L$ means $f(x)$ approaches [1]

A B
C D

A a
B L as x approaches a
C infinity
D $f(a)$ always

3.2 The value of a limit [1]

A B
C D

A always equals $f(a)$
B may differ from $f(a)$
C is always 0
D never exists

3.3 $f(x) = x + 1$.

(a) State $\lim_{x \to 2} f(x)$. [1]

(b) State $f(2)$. [1]

(c) State whether they agree. [1]