1 Continuity and asymptotes – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
continuous	连续	
vertical asymptote	渐近线	

Recall

In Part A you met limits. Now use them to describe how smooth a graph is:

- Some graphs you can draw without lifting your pen.
- Others have jumps, holes, or shoot off to infinity.

Each idea has a worked example before the Practice.

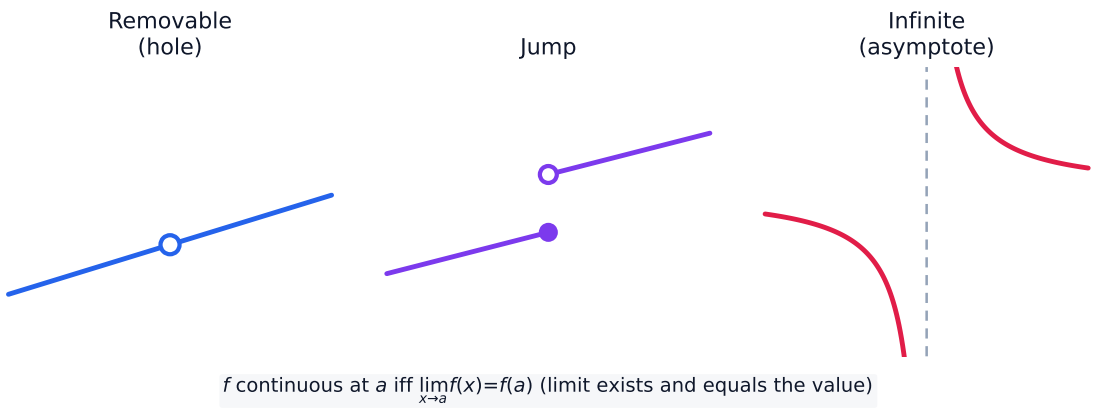
New ideas

■ 1 Continuity

A function is **continuous** 连续 at a point if it has no break there – no hole, jump, or gap. A continuous graph can be drawn without lifting your pen.

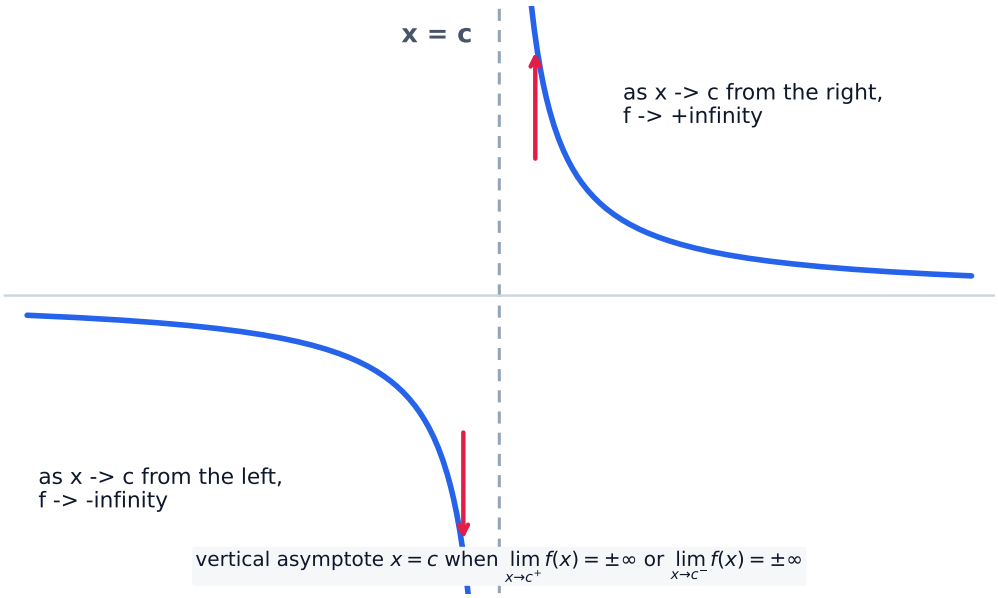
■ 2 Discontinuities

Where a graph breaks, it is **discontinuous**. The main kinds are a **hole**, a **jump**, and an **asymptote**.



3 Vertical asymptotes

A **vertical asymptote** 渐近线 is a line the graph shoots up (or down) toward, without ever touching – it happens where the function blows up to infinity (like dividing by zero).



4 Horizontal asymptotes

A **horizontal asymptote** is a value the graph levels off toward as x gets very large (or very negative).

Watch out: a graph can **cross** a horizontal asymptote but never crosses a **vertical** one – near a vertical asymptote the function races off to $\pm\infty$ instead.

Practice

Try these in order. The methods are all above.

2.1 State what it means for a function to be continuous at a point. [2]

2.2 Name three kinds of discontinuity. [3]

2.3 State what happens to a function near a vertical asymptote. [2]

2.4 State what a horizontal asymptote describes. [2]

2.5 For $f(x) = \dfrac{1}{x-3}$, state where the vertical asymptote is. [1]