

9 Residuals and checking the model

– 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)
residual	残差	_____

Recall

In Part A you tested a regression slope. Now check whether a line is even the **right** model:

- A straight line is not always the best fit.
- The leftover errors (residuals) reveal whether it fits.

Each idea has a worked example before the Practice.

New ideas

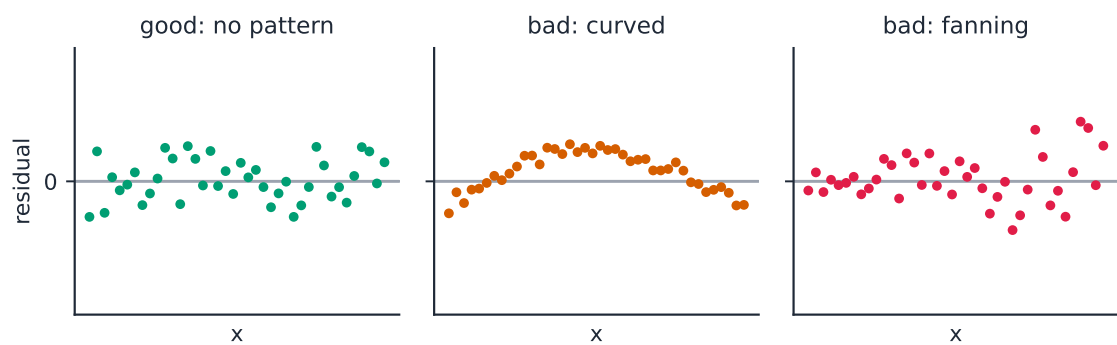
■ 1 Residuals

A **residual** 残差 is the gap between an actual value and the line's prediction: $\text{residual} = \text{actual} - \text{predicted}$.

Worked example. If the line predicts 70 but the actual value is 73, the residual is $73 - 70 = +3$.

■ 2 The residual plot

A **residual plot** graphs the residuals against x . It magnifies how the line misses the points.



$\text{residual} = y - \hat{y}$ · random scatter about 0 supports a linear model (LINER)

■ 3 No pattern is good

If the residual plot shows **no pattern** (a random scatter around zero), a straight line is a good model.

■ 4 A pattern is bad

If the residual plot shows a **curve** or other pattern, a straight line is the **wrong** model – the data bend in a way the line cannot follow.

Watch out: a good model has a residual plot with **no pattern**. A clear pattern (like a U-shape) is a warning that a straight line is the wrong choice, even if the correlation looked high.

Practice

Try these in order. The methods are all above.

2.1 State what a residual is. [2]

2.2 A line predicts 50 but the actual value is 46. Find the residual. [2]

2.3 State what a residual plot graphs. [2]

2.4 State what a residual plot with no pattern tells you. [2]

2.5 State what a clear pattern (like a curve) in the residual plot tells you. [2]
