

# 9 Residuals and checking the model

## – Part 2

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

### Vocabulary

*Write each word three times.*

**English**

**Write it 3 times** (English)

residual

\_\_\_\_\_

### 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

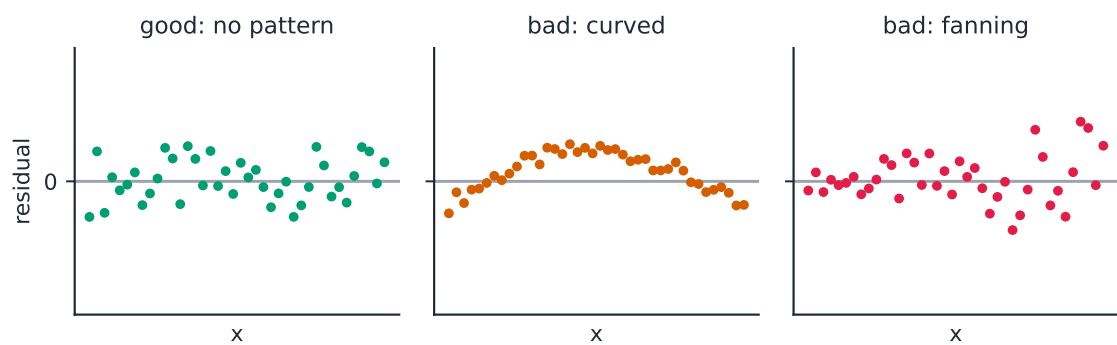
#### ■ 1 Residuals

A **residual** 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]

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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]

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

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

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