

Exercise walk-through

Competing Function Model Validation ■ 2.6

eXercise

You must be able to

- compute a **residual** 残差 (observed minus predicted)
- use residuals to compare and validate competing models

Method — Residuals

$$\text{residual} = \text{observed} - \text{predicted}.$$

A model fits well when the residuals are **small** and show **no pattern**. To choose between two candidate models, compare their residuals.

Method — Example

Observed 20, predicted 18 $\rightarrow$ residual = 2 (the model under-predicted).

Practice 2.1 ■ 1 mark

Define a residual.

Solution 2.1

Worked steps

the observed value minus the predicted value **B1**.

Practice 2.2 ■ 1 mark

State what small, patternless residuals indicate.

Solution 2.2

Method: Residuals

Worked steps

the model fits the data well **B1**.

Practice 2.3 ■ 1 mark

The observed value is 20 and the predicted value is 18. Find the residual.

Solution 2.3

Worked steps

$$20 - 18 = 2 \text{ (B1).}$$

Exam-style 3.1 ■ 1 mark

A residual is

A predicted minus observed

B observed minus predicted

C observed times predicted

D the slope

Solution 3.1

A predicted minus observed

B observed minus predicted 

C observed times predicted

D the slope

Worked steps

B.

Exam-style 3.2 ■ 1 mark

A well-fitting model has residuals that are

- A** large and patterned
- B** small and patternless
- C** all positive
- D** steadily increasing

Solution 3.2

Method: Residuals

- A large and patterned
- B small and patternless**
- C all positive
- D steadily increasing



Worked steps

B.

Exam-style 3.3 ■ 1 mark

A model predicts 50; the actual value is 46.

- (a) Find the residual.
- (b) State whether the model over- or under-predicted.
- (c) State what a residual plot should look like for a good fit.

Solution 3.3

Method: Example

Worked steps

(a) $46 - 50 = -4$ **B1**. (b) over-predicted **B1**. (c) scattered around zero with no pattern **B1**.