

Exercise walk-through

2.8

Least Squares Regression

AP Statistics

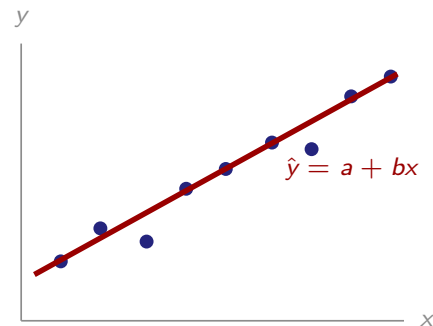
The regression line

The **least-squares regression line** :

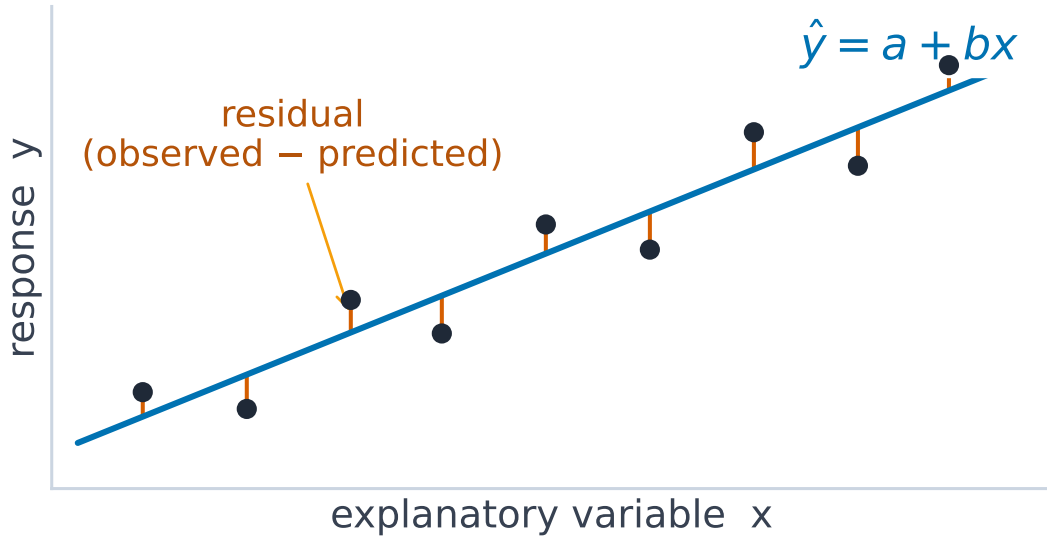
$$\hat{y} = a + bx$$

- **slope** b : predicted change in y per unit x
- **intercept** a : predicted y at $x = 0$

Use it to **predict** , but never **extrapolate** far beyond the data.



Least-Squares Regression and Its Fit



residual = $y - \hat{y}$ · least squares minimises $\sum (y - \hat{y})^2$

The least-squares line minimizes the sum of squared residuals

Exercises 2.1-2.3

2.1 State what the least-squares line minimises.

[1]

2.2 State what r^2 represents.

[1]

2.3 If $r = 0.8$, find r^2 .

[2]

Exercises 2.1-2.3

2.1 State what the least-squares line minimises.

[1]

2.1

- the sum of the squared residuals
-

2.2 State what r^2 represents.

[1]

2.2

- the proportion of the variation in y explained by the model
-

2.3 If $r = 0.8$, find r^2 .

[2]

2.3

- $r^2 = 0.8^2 = 0.64$

Exercises 3.1-3.2

3.1 The least-squares line minimises the sum of the

[1]

☐

- A residuals
- B squared residuals
- C x -values
- D predictions

3.2 An r^2 of 0.64 means

[1]

☐

- A 64% of the variation in y is explained by the model
- B $r = 0.64$
- C there are 64 outliers
- D there is no relationship

Exercises 3.1-3.2

3.1 The least-squares line minimises the sum of the

[1]

☐

- A residuals
- B squared residuals
- C x -values
- D predictions

3.1 B

- squared residuals.

3.2 An r^2 of 0.64 means

[1]

☐

- A 64% of the variation in y is explained by the model
- B $r = 0.64$
- C there are 64 outliers
- D there is no relationship

3.2 A

- 64% of the variation in y is explained by the model.

Exercise 3.3 (a)

3.3 A regression has $r = 0.9$.

(a) Find r^2 .

[2]

Exercise 3.3 (a)

3.3 A regression has $r = 0.9$.

(a) Find r^2 .

[2]

(a)

- $r^2 = 0.9^2 = 0.81$

Exercise 3.3 (b)

3.3 A regression has $r = 0.9$.

(b) Interpret r^2 in context (the variation in y).

[1]

Exercise 3.3 (b)

3.3 A regression has $r = 0.9$.

(b) Interpret r^2 in context (the variation in y).

[1]

(b)

- about 81% of the variation in y is explained by the model