Learning Goals

- Explain the purpose of a line of best fit and how it can be used to make predictions.
- Identify the independent and dependent variables in a linear relationship.
- Interpret the meaning of the slope and intercept in the context of a problem.
- Use R to create a line of best fit with `lm()` and visualize it with `plot()` and `abline()`.
- Make predictions using a linear model and understand the limitations of extrapolation.

Key Terms

Define each term in your own words and include an example when possible.

- Line of Best Fit:
- Independent Variable (Predictor):
- Dependent Variable (Response):
- Slope:
- Intercept:
- `lm()`:
- Extrapolation:

Key Concepts

1. What does a line of best fit allow us to do with a dataset?

2. How do we decide which variable belongs on the x-axis and which belongs on the y-axis?

3. In the model grade $= 2.5 \times$ attendance $+ 50$, what does the slope and intercept mean in context?

4. In the model grade $= 2.5 \times$ attendance $+ 50$, what would the predicted student's grade be if they attended 17 classes?

5. Why does the intercept sometimes not make practical sense? Provide an example.

6. Why is extrapolation (predicting far outside the data range) discouraged when using a line of best fit?

7. Suppose Emmit collects data on how long it takes him to walk different distances. If he wants to predict walking time from distance, which variable is the predictor and which is the response?