Discussion - Week 10

Example 1 (One-Way Table)

A six-sided die is rolled 150 times. The observed counts of each outcome are presented below. Conduct a hypothesis test to determine if the die is fair (i.e. if the true proportions of all outcomes are equal).

Outcome	1	2	3	4	5	6
Observed Count	32	24	22	29	17	26

(a) State the hypotheses.

(b) Compute the test statistic.

(c) Are the conditions for a one-way test satisfied?

(d) What is the null distribution of the statistic?

(e) Approximate the p-value.

(f) Make a conclusion at $\alpha = 0.05$.

(g) What would a Type I error be in this setting?

Example 2 (Two-Way Table)

A random sample of 300 Davis residents were asked to name their preferred method of commuting to work (car, bike/walk, or public transportation), and their preference of cats or dogs. The observed counts are presented below. Use a hypothesis test to determine if pet preference and commute preference are independent.

	Car	Bike/Walk	Public Transport
Cat	60	41	29
Dog	82	58	30

(a) State the hypotheses.

(b) Compute the test statistic.

(c) Are the conditions for a test for independence satisfied?

(d) What is the null distribution of the statistic?

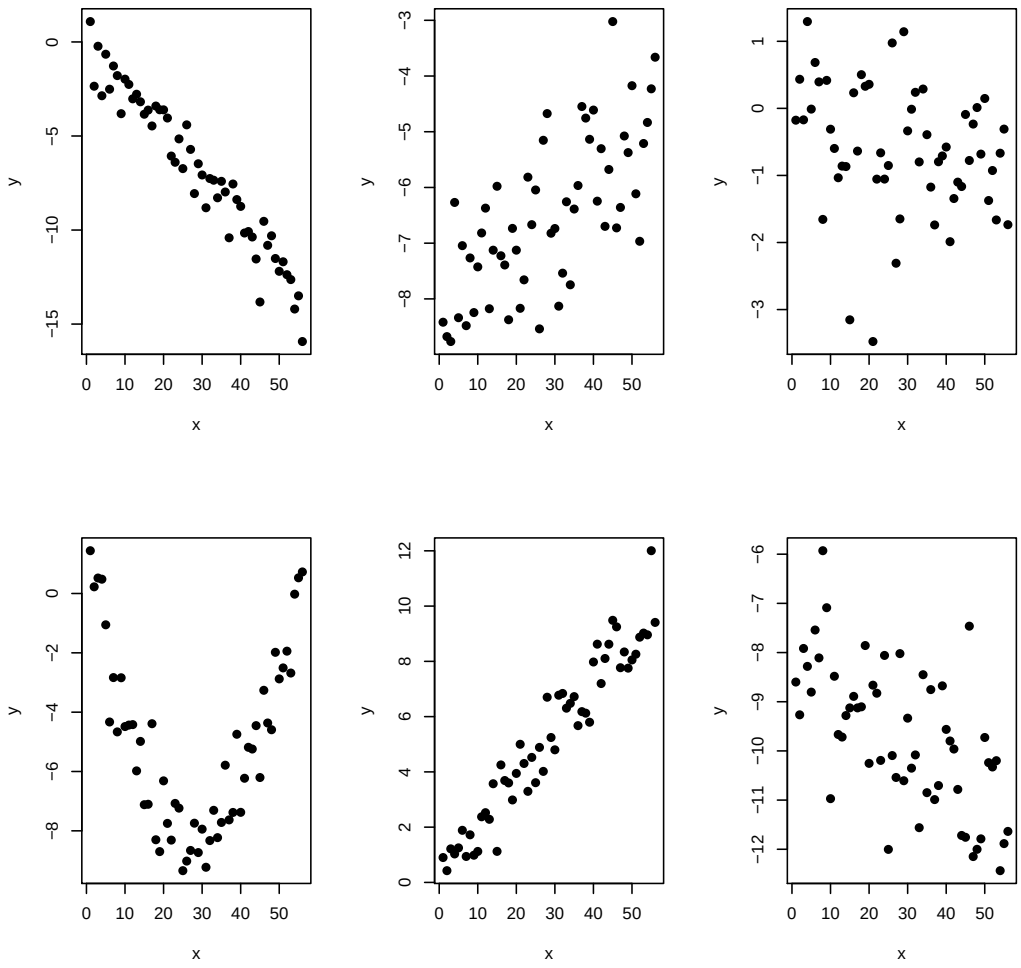
(e) Approximate the p-value.

(f) Make a conclusion at $\alpha = 0.05$.

(g) What would a Type I error be in this setting?

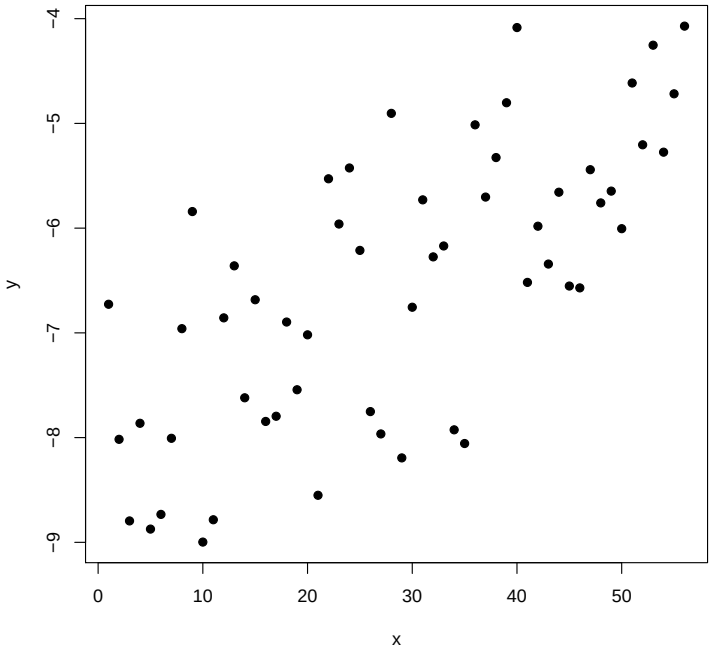
Example 3 (Correlation)

Here are six sample correlation values: 0.961, 0.003, -0.248, -0.628, 0.7, -0.967. Match each sample correlation value to the correct scatterplot.



Example 4 (Regression)

Here is a scatterplot of 56 observations of two continuous random variables X and Y. A regression model was fit to the sample, and the estimated regression line is $\hat{Y} = -8.216 + 0.058X$.



(a) Comment on the strength and sign of the linear relationship between X and Y.

(b) Does it seem like the sample correlation coefficient is positive or negative?

(c) Use the estimated regression line to predict the average value of Y when X is 17. Can you do the same when $X = 100$? Explain.

(d) Interpret the value 0.058 from part (c).