Sheet 6: Joint distributions and normal distributions

NOTE: All results should be rounded to two decimal places unless otherwise stated. If a number or result has fewer decimal places, it is okay to keep fewer. For probabilities, give two decimal places when expressed in percentage (e.g., 12.34%) and four decimal places when expressed as numbers (e.g., 0.1234).

Exercise 1
[D, Section 5.2, Exercise 22 + Exercise 30]

Exercise 2
[D, Section 5.2, Exercise 31]

Exercise 3
[D, Section 5.5, Exercise 64]

Exercise 4
[D, Section 5.5, Exercise 69]

Exercise 5
[D, Section 4.3, Exercise 35abce]

Exercise 6
[D, Section 4.3, Exercise 44]

Exercise 7
[D, Section 5.5, Exercise 73]

Exercise 8
[D, Section 5.4, Exercise 50bc]

Exercise 9

a) Give a condition on two variables X and Y such that

$$E[XY] = E[X]E[Y].$$

Suppose that $X \sim \mathcal{U}(\{-1, 0, 1\})$ and $U \sim \mathcal{U}(\{-1, 1\})$ are independent. Let $Y = XU$.

b) Show that X and Y are uncorrelated.

c) Show that X and Y are not independent.