STAT 2857A – Lecture 16 Examples and Exercises

Example 16.1

The adult heights of people assigned to be male and female at birth can be modelled amazingly well by a normal distribution. Suppose that the adult height people assigned to be female at birth is normally distributed with mean 64 inches and standard deviation 3 inches.

$$X \sim \text{Normal}(64, 9).$$

a) What is the density of X? Sketch the density.
b) What is the probability that someone assigned to be female at birth will be:

    i) less than 5 feet tall?
    ii) greater than 6 feet tall?
    iii) between 5 and 6 feet tall?

c) Find values l and u such that $P(l < X < u) \approx .95$.
d) Repeat part b) using standardization.
e) Repeat part c) using standardization.

Example 16.2

A standard roulette wheel has 37 pockets in which the ball may land. Of these, 18 pockets are red, 18 are black, and 1 is green. Suppose that you place \$1 bets that the ball will land in a black pocket on 200 consecutive games. Let X be the number of times you win.

a) What is the exact probability that you win between 95 and 105 games inclusive?
b) Approximate this probability with the normal distribution?

Exercise 16.1

Suppose that the amount of time a cell phone battery lasts normally distributed with mean 28 hours and standard deviation 4 hours depending on the use.

a) Sketch the probability density function.
b) Shade the area defining the probability that the battery lasts for more than 34 hours.
c) What is the probability that the battery lasts for more than 34 hours? Compute the value using the calculator and by standardizing.
d) Compute the probability that the battery lasts for more than 36 hours without using the calculator or standardizing.