Data 88S

April 10, 2024

Chapter 8, Exercise 2

1. Suppose the numbers of M&Ms in the small 1.69-ounce bags of the candy are i.i.d. with mean 55 and SD 2. Let X be the total number of M&Ms in 100 such bags. Find or approximate $P(X > 5525)$.

2. A state has millions of households. The average annual income of the households is 100,000 dollars and the SD is 40,000 dollars. Fill in the blank with a number:

    "There is about a 95% chance that the average annual income of a simple random sample of 1,600 families drawn from the state is more than _____ dollars."

3. An office building has 600 lightbulbs, each of which fails with probability 0.25, independently of all the other bulbs, in a year. What is the approximate probability that at least half of the bulbs have to be replaced in 2024?

4. Suppose you sample 500 people from a population of million,and ask them whether they voted for Party A in an election. Assume that party A receives 70% votes in total from the whole population. Approximate the probability that at most 100 people in your sample voted for party A.

5. In the last problem, what is the smallest number of people you need to survey such that the probability that at most 65% of your surveyed people voted for A is at most $0.01 = 1\%$? Use the CLT for the approximation. You can express your answer in terms of the percentile of the normal distribution.