Problems:

1. Consider a population of six elements, which we will denote as \( \{a, b, c, d, e, f\} \). List all possible samples of size three which can be drawn from this population. If we assume that the sample is random, what is the probability of choosing the sample \( acd \)?

2. Say that we have a group of six people whose weights are given by the set \( \{110, 115, 140, 145, 160, 195\} \). Assume that we choose a random sample of size two from this population and compute its mean. Compute the probability distribution of the values this sample mean can take.

3. Compute the mean of that probability distribution.

4. Let’s say that we have chosen a sample of an infinite population. What happens to the standard deviation of the sampling mean if we change the sample size from \( n = 10 \) to \( n = 100 \)? What about if we change the sample size from \( n = 250 \) to \( n = 25 \)?

5. Same question as above, but now assume that the population is finite of size \( N = 1000 \).

6. A study made by a staff officer of an armored division shows that for a random sample of \( n = 40 \) days, the division has an average of 1,126 vehicles in operating condition, with a standard deviation of \( \sigma = 123 \). The officer decides to use 1,126 as an estimate of the average number of vehicles in operating condition. What is the maximum error that this estimate will incur, with a 95% confidence?

7. Same problem, with 99% confidence?

8. We have an experiment where we have sampled the pollution of the air in a downtown area of a given city on \( n = 100 \) days, where we measure pollution in number of particles measured per cubic meter. Assume that the data has a mean of 4.86 and a standard deviation of 3.21. Construct a 95% confidence interval for the mean level of pollution.