

MATH-57091 Probability and Statistics for High-School Teachers.

Home Work 7, due on Wednesday, October 19,

Instructor: Prof. Artem Zvavitch

Each Problem is 11 points.

Problem 1. Consider a sample from a population having mean 128 and standard deviation 16. Compute the approximate probability that the sample mean will lie between 124 and 132 when the sample size is

- $n = 9$
- $n = 25$
- $n = 100$.

Problem 2. The time it takes to develop a photographic print is a random variable with mean 17 seconds and standard deviation 0.8 seconds. Approximate the probability that the total amount of time that it takes to process 100 prints is

- More than 1720 seconds.
- Between 1690 and 1710 seconds.

Problem 3. A six-sided die, in which each side is equally likely to appear, is repeatedly rolled until the total of all rolls exceeds 400 (i.e. the sum of outcomes of the rolls is greater than 400). What is the approximate probability that this will require more than 140 rolls?

Problem 4. Suppose that the number of miles that an electric car battery functions has mean μ and standard deviation 100. using the central limit theorem approximate the probability that the average number of miles per battery obtained from a set of n batteries will differ from μ by more than 20 is

- $n = 10$
- $n = 40$
- $n = 100$.

Problem 5. Consider a sample of size 16 from a population having mean 100 and standard deviation σ . Approximate the probability that the sample mean lies between 96 and 104 when

- $\sigma = 16$.
- $\sigma = 8$.
- $\sigma = 4$.
- $\sigma = 2$.
- $\sigma = 1$.