

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

**Home Work 8, due on Monday November 5,  
Instructor: Prof. Artem Zvavitch**

**Problem 1.** *The following data represents the number of minutes each of a random sample of 15 recent patients at a medical clinic spent waiting to see a physician*

46, 48, 22, 55, 45, 23, 54, 60, 36, 44, 50, 35, 66, 48, 30.

*Use these data to estimate the average waiting time of all patients at this clinic. Also, please, provide the estimation for standard deviation.*

**Problem 2.** *The city of Chicago had 12048 full-time law enforcement officers in 1990. To determine the number of African-Americans in this group, a random sample of 600 officers was chosen and it was discovered that 87 were African Americans.*

- *Estimate the the number of African Americans law enforcement of-ficers who were employed full time in Chicago in 1990.*
- *Estimate the standard error of the above estimate.*

**Problem 3.** *An electric scale gives a reading equal to the true weight plus a random error that is assumed to be normally distributed with mean 0 and standard deviation  $\sigma = 0.1$  ounces. Suppose that the results of five successive weighings of the same object are follows: 3.142, 3.163, 3.155, 3.155, 3.150, 3.1441.*

- *Determine a 95 percent confidence interval estimate of the true weight.*
- *Determine a 99 percent confidence interval estimate if the true weight.*
- *How many more weighings you should do to make sure that 99 per-cent confidence interval is no longer then .001?*

**Problem 4.** *The life of a particular brand of television picture tube is known to be a normally distributed with a standard deviation of 400 hours. Suppose that a random sample of 20 tubes resulted in an average lifetime of 9000 hours. Obtain a*

- *90 percent*
- *95 percent*
- *99 percent*

*confidence interval estimate of the mean lifetime of such tube.*

**Problem 5.** *The average life of a sample of 10 tires of certain brand was 28400 miles. If it is known that the lifetimes of such tires are normally distributed with a standard deviation of 3300 miles determine 95 percent confidence interval estimate of the mean life. Also, please, find how large a sample would be needed to obtain a 99 percent confidence interval estimator of smaller size than the interval you just obtained?*