

MATH-57091 Probability and Statistics for High-School Teachers.
Home Work 9, due on Thursday, November 3,
EACH PROBLEM IS 12 points,
Instructor: Prof. Artem Zvavitch

Problem 1. *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 six 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 of the true weight.*
- **(Wait for lecture 9.2)** *How many more weighings you should do to make sure that 99 percent confidence interval is no longer than .001?*

Problem 2. *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.

Please continue after lecture 9.2.

Problem 3. *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?*

Problem 4. *The standard deviation of test scores on a certain achievement test is 11.3. A random sample of 81 students had a sample mean score of 74.6. Find a*

- *90 percent confidence interval estimate for the average score of all students.*
- *90 percent lower confidence bound.*
- *95 percent lower confidence bound.*
- *95 percent upper confidence bound.*
- *99 percent upper confidence bound.*

Problem 5. *The following are data from a normal population with standard deviation 3:*

5, 4, 8, 12, 11, 7, 14, 12, 15, 10

- *Find the value that, with 95 percent confidence, is larger than the population mean.*
- *Find the value that, with 99 percent confidence, is larger than the population mean.*