

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

**Home Work 10, due on Wednesday, November 9,**

**Each problem is 9 points, there are 6 problems,**

**Instructor: Prof. Artem Zvavitch**

**Problem 1.** *Each of 20 science students independently measured the melting points of lead. The sample mean and sample standard deviation of these measurements were (in degrees Celsius) 330.2 and 15.4 respectively. Construct a 95 and 99 percent confidence interval estimate of the true melting point of lead.*

**Problem 2.** *Twelve successively tested lightbulbs functioned for the following lengths of time (measured in hours):*

35.6, 39.2, 18.4, 42.0, 45.3, 34.5, 27.9, 24.4, 19.9, 40.1, 37.2, 32.9.

- *Give a 95 percent confidence interval estimate of the mean life of a lightbulb.*
- *A claim has been made that the results of this experiment indicate that "One can be 99 percent certain that the mean life exceeds 30 hours". Do you agree with this claim?*

**Problem 3.** *To convince a potential buyer of the worth of her company, an executive had ordered a survey of the daily cash receipts of the business. A sample of 14 days revealed the following values (in 100 of dollars):*

33, 12, 48, 40, 26, 17, 29, 38, 34, 41, 25, 51, 49, 34.

*If the executive wants to present these data in the most favorable way, should she present a confidence interval estimate of a one-sided confidence bound? If one-sided should it be an upper or lower bound? If you were the executive, how would you complete the following "I am 95 percent confident that ...."*

**Wait for Lecture 10.2**

**Problem 4.** *A random sample of 500 Californian voters indicated that 302 are in favor of the death penalty. Construct a 99 percent confidence interval estimate of the proportion of all Californian voters in favor of the death penalty.*

**Problem 5.** *A market research firm is interested in determining the proportion of households that are watching a particular sporting event. To accomplish this task, it plans on using a telephone poll of randomly chosen households.*

- (1) *How large a sample is needed if the company wants to be 90 percent certain that its estimate is correct to within  $\pm 0.02$ ?*
- (2) *Suppose there is a sample of the size you got from (1). If 23 percent of the sample were watching the sporting event, do you expect that the 90 percent confidence interval will be exactly of length 0.02, larger than 0.02, or smaller than 0.02?*
- (3) *Now, please, construct the 90 percent confidence interval for (2).*

**Problem 6.** *A random sample of 1000 psychologists included 457 men. Give a 95 percent lower estimate of the proportion of all psychologists who are men.*