

## MA145 - ASSIGNMENT 6

**Name:**

**Problem 1** A very large study by the U.S. National Center for Health Statistics found the mean serum HDL cholesterol level of males age 20-29 was 47 with a standard deviation of 12.5. A physician selects 15 males in this age group from his practice and finds the mean HDL level is 48.3. Assume that HDL levels are approximately normally distributed.

a) Find a 95% confidence interval for the mean HDL level of the physician's patients.

b) Find a 99% confidence interval for the mean HDL level of the physician's patients.

c) Would you conclude that the physician's patients have higher HDL cholesterol than the general population? Why or why not?

d) Suppose the physician repeats the experiment with a sample of 75 patients, and finds the mean for this sample is 48.4. Find a 95% confidence interval for the mean HDL level of the physician's patients.

e) Find a 90% confidence interval for the mean HDL level based on the sample of 75 described in d)

f) What is the margin of error for the original sample of 15?

- g) What is the margin of error for the larger sample of 75?
- h) What sample size would be required to estimate the mean HDL level within a margin of error of 2?

**Problem 2** Researchers investigating the SARS illness interviewed 81 SARS patients to determine the incubation period. For their sample, the mean incubation time was 4.6 days and the sample standard deviation was 15.9.

- a) Find a 95% confidence interval for the mean incubation time of SARS.
- b) Find a 99% confidence interval for the mean incubation time.
- c) Find a 90% confidence interval for the mean incubation time.
- d) Suppose the researchers conduct a second survey with sample of 180 patients, and for this sample the mean incubation time is 4.3 days and the standard deviation is 10.3. Find a 95% confidence interval for the incubation time based on this sample.
- e) Find a 90% confidence interval for the incubation time based on the sample described in d)
- f) Suppose we incorrectly treated the sample standard deviation in part a) as the true population standard deviation. What would our (incorrectly computed) 95% confidence interval be?

g) In this analysis we implicitly assumed that the mean incubation time is approximately normally distributed. How do we justify this assumption?

**Problem 3** A sociologist conducts a poll to estimate the percentage of Americans who favor affirmative action programs for women and minorities for admission to colleges and universities. Out of 550 respondents, 301 favor these programs.

a) Verify that the assumptions for constructing a confidence interval about  $\hat{p}$  are satisfied.

b) Find a 95% confidence interval for the proportion of Americans that favor these programs.

c) Find a 90% confidence interval for the proportion that favor these programs.

d) Find a 99% confidence interval for the proportion that favor these programs.

e) Suppose the sociologist obtains a grant to do a followup survey to estimate the proportion within 1 percentage point with 95% confidence. What sample size is required based on the point estimate obtained in the first survey?

f) Suppose the sociologist wants to avoid using the results of the first survey to compute the sample size, and instead wants to assume the worst case. What sample size is required now to estimate the proportion within 1 percentage point with 95% confidence?