

Chapters 9 and 10: 90 points total - Submit your work in an Excel file including your Megastat output (labeling your answers with the question number/part). Be sure to show your work so you can earn partial credit if you were on the right track, but may have ended up with an incorrect final answer.

Chapter 9:

1. Adult height is approximately normally distributed. According to the *Statistics in Action* box on p. 202-203 in your textbook, for the height of women, the population standard deviation is 2.48 inches. In a sample of 22 female adult students, the mean height is 64.73 inches.
 - a. Because we are given the population standard deviation, what distribution should we use when calculating the confidence interval for the population mean height of adult women?
 - b. Create a 90% confidence interval for the mean height of adult women.
 - c. The *Statistics in Action* box states that the mean is 63.6 inches for female height. Does our sample confirm this? How is this possible? Explain why or why not using your answer from part b.
2. Students in an Introductory Statistics course were asked how many credits they had completed before the course began. This data has been gathered in the **Credits data set** provided. You will analyze this data set (also used in your Week #1 assignment) as a sample of college students who take Introductory Statistics.
 - a. Create a 95% confidence interval for the mean of the **Credits data set**.
 - b. Create a 90% confidence interval for the mean of the **Credits data set**.
 - c. If someone said most students who take Introductory Statistics have completed 75 credits, is that a reasonable conclusion from your confidence interval calculations? Why or why not?
3. MA 1510 students were asked for their age on a class survey (for statistical purposes only). This data has been gathered in the **Student Age data set** provided. This data represents a sample of SCPS students who have taken this course from three sessions.
 - a. Create a 95% confidence interval for the mean of the **Student Age data set**.
 - b. Create a 99% confidence interval for the mean of the **Student Age data set**.
 - c. Is it reasonable to conclude that the true population mean age of students taking MA 1510 is 35 years old? Why or why not?
 - d. What sample size would be needed to find an estimate that is within 1 year of the true mean age of students taking MA 1510 using a 95% confidence level?
4. From class surveys, a facilitator finds that 68 of 98 students who have taken MA 1510 were born in PA. The college is interested in determining if people who were born outside PA need to be targeted for a marketing campaign.
 - a. Estimate the value of the population proportion.
 - b. Create a 95% confidence interval for the population proportion of SCPS students who were born in PA.
 - c. Create a 90% confidence interval for the population proportion of SCPS students who were born in PA.
 - d. Create a 99% confidence interval for the population proportion of SCPS students who were born in PA.

- e. An administrator (who wasn't aware of this survey) suggests that 85% of SCPS students were born in PA. What do your confidence interval calculations tell you about this claim? Explain.
- f. If SCPS wants to find an estimate that is within 3% of the true proportion of students who were born in PA, what sample size would they need to obtain? Assume a 95% confidence level and use the estimate of the value of the population proportion that you calculated in part a.
- g. After seeing the sample size from part f, a decision is made that a smaller sample would be acceptable. What sample size is needed if instead they're looking for 90% confidence and the estimate can be within 5% of the true proportion of students who were born in PA? Explain what factors make this answer differ from your calculation in part f.

Chapter 10:

- 5. Adult height is approximately normally distributed. According to the *Statistics in Action* box on p. 202-203 in your textbook, for the height of women, the population standard deviation is 2.48 inches. In a sample of 22 female adult students, the mean height is 64.73 inches.
 - a. Perform a one-sided hypothesis test to test the claim that the mean is greater than the population mean of 63.6 inches suggested in the textbook.
 - i. Write the hypotheses using the appropriate symbols.
 - ii. Test the hypotheses at the $\alpha = 0.05$ level of significance. Show your test statistic and decision rule. Make a decision regarding the null hypothesis. Interpret the results of the test by writing the conclusion in terms of the problem in a clear sentence that someone not taking this course would understand.
 - b. Perform a two-sided hypothesis test to test the claim that the mean is not equal to the population mean of 63.6 inches suggested in the textbook.
 - i. Write the hypotheses using the appropriate symbols.
 - ii. Test the hypotheses at the $\alpha = 0.05$ level of significance. Show your test statistic and decision rule. Make a decision regarding the null hypothesis. Interpret the results of the test by writing the conclusion in terms of the problem in a clear sentence that someone not taking this course would understand.
- 6. Using the data in the **Student Age data set** provided, test the following claims using the five step hypothesis testing process.
 - a. Perform a one-sided hypothesis test to test the claim that the mean age of students taking MA 1510 is less than 40 years old.
 - i. Write the hypotheses using the appropriate symbols.
 - ii. Test the hypotheses at the $\alpha = 0.05$ level of significance. Show your test statistic and decision rule. Make a decision regarding the null hypothesis. Interpret the results of the test by writing the conclusion in terms of the problem in a clear sentence that someone not taking this course would understand.
 - b. Perform a two-sided hypothesis test to test the claim that the mean age of students taking MA 1510 is different from 35 years old.
 - i. Write the hypotheses using the appropriate symbols.
 - ii. Test the hypotheses at the $\alpha = 0.05$ level of significance. Show your test statistic and decision rule. Make a decision regarding the null hypothesis. Interpret the

results of the test by writing the conclusion in terms of the problem in a clear sentence that someone not taking this course would understand.

7. From class surveys, a facilitator finds that 68 of 98 students who have taken MA 1510 were born in PA. The college is interested in determining if people who were born outside PA need to be targeted for a marketing campaign. Analyze this information using the five step hypothesis testing process to test the claim that greater than 60% of SCPS students were born in PA.
 - i. Write the hypotheses using the appropriate symbols.
 - ii. Test the hypotheses at the $\alpha = 0.05$ level of significance. Show your test statistic and decision rule. Make a decision regarding the null hypothesis. Interpret the results of the test by writing the conclusion in terms of the problem in a clear sentence that someone not taking this course would understand.