Chapter 10 – Homework #1

In Exercises 1 to 3, determine the point estimator you would use and calculate the value of the point estimate.

1) How many pairs of shoes, on average, do female teens have? To find out, an AP Statistics class conducted a survey. They selected an SRS of 20 female students from their school. Then they recorded the number of pairs of shoes that each student reported having. Here are the data.

50	26	26	31	57	19	24	22	23	38
13	50	13	34	23	30	49	13	15	51

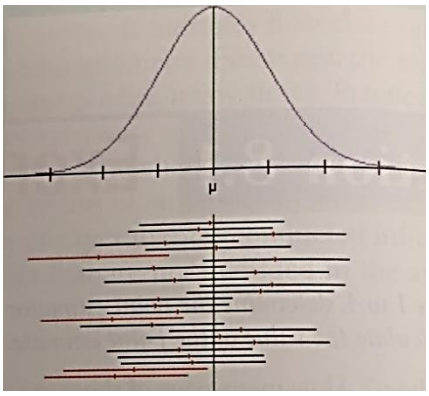
2) The class in exercise 1 wants to estimate the variability in the number of pairs of shoes that female students have by estimating the population variance σ^2.

3) Tonya wants to estimate what proportion of the seniors in her school plan to attend the prom. She interviews an SRS of 50 of the 750 seniors at her school and finds that 36 plan to attend prom.

4) A *New York Times/*CBS News Poll asked a random sample of U.S. adults the question "Do you favor an amendment to the Constitution that would permit organized prayer in public schools?" Based on this poll. The 95% confidence interval for the population proportion who favor such an amendment is (0.63, 0.69).
   a. Interpret the confidence interval.
   b. What is the point estimate that was used to create the interval? What is the margin of error?
   c. Based on this poll, a reporter claims that more than two-thirs of U.S. adults favor such an amendment. Use the confidence interval to evaluate this claim.

5) A Gallup Poll asked a random sample of U.S. adults "Would you like to lose weight?" Based on this poll, the 90% confidence interval for the population proportion who wan to lose weight is (0.56, 0.62).
   a. Interpret the confidence interval.
   b. What is the point estimate that was used to create the interval? What is the margin of error?
   c. If Gallup had chosen to contract a 95% confidence interval, how would the following change?
      i. The point estimate
      ii. The margin of error
      iii. The standard error

6) The figure below shows the results of taking 25 SRSs from a Normal population and constructing a confidence interval for each sample. Which confidence level – 80%, 90%, 95%, or 99% –do you think was used? Explain.



7) Refer to exercise #5. The news article goes on to say: "The theoretical errors do not take into account … additional error resulting from the various practical difficulties in taking any survey of public opinion". List some of the "practical difficulties" that may cause errors **which are not included in the ± 3 percentage point margin of error.**

8) Many teens have posted profiles on sites such a Facebook. A sample survey asked random samples of teens with online profiles if they included false information in their profiles. Of 170 younger teens (age 12-14) polled, 117 said "Yes". Of the 317 older tends (ages 15-17) polled, 152 said "Yes". A 95% confidence interval for the difference in the population proportion (younger teens – older teens) is 0.120 to 0.297. Interpret the confidence interval and the confidence level.

9) Refer the previous exercise. Does the confidence interval give convincing evidence of a difference in the population proportions of younger and older teens who include false information in their profiles? Justify your answer.

10) A 95% confidence interval for the mean body mass index (BMI) of young American women is 26.8 ±0.6. Discuss whether each of the following explanations is correct.

    a. We are confident that 95% of all young women have a BMI between 26.2 and 27.4.

b. We are 95% confident that future samples of young women will have a mean BMI between 26.2 and 27.4.
c. Any value from 26.2 to 27.4 is believable as the true mean BMI of young American women.
d. If we took many samples. The population mean BMI will be between 26.2 and 27.4 in about 95% of those samples.
e. The mean BMI of young American women cannot be 28.

11) The admissions director from Big City University found that (107.8, 116.2) is a 95% confidence interval for the mean IQ score of all freshmen. Discuss whether each of the following explanations is correct.
    a. There is a 95% probability that the interval from 107.8 to 116.2 contains μ
    b. There is a 95% chance that the interval (107.8, 116.2) contains $\bar{x}$.
    c. This interval was constructed using a method that produces intervals that capture the true mean in 95% of all possible samples.
    d. If we take many samples. About 95% of them will contain the interval (107.8, 116.2).
    e. The probability that the interval (107.8, 116.2) captures μ is either 0 or 1, but we don't know which.

Multiple Choice

Use for exercises #12 and 13 A researcher plans to use a random sample of families to estimate the mean monthly family income for a large population.

12) The researcher is deciding between a 95% confidence level and a 99% confidence level. Compared to a 95% confidence interval, a 99% confidence interval will be
    a. Narrower and would involve a larger risk of being incorrect.
    b. Wider and would involve a smaller risk of being incorrect.
    c. Narrower and would involve a smaller risk of being incorrect.
    d. Wider and would involve a larger risk of being incorrect.
    e. Wider and would have the same of being incorrect.

13) The researcher is deciding between a sample of size n = 500 and a sample of size n = 1000. Compared to using a sample size of n = 500, a 95% confidence interval based on n = 1000 will be…
    a. Narrower and would involve a larger risk of being incorrect.
    b. Wider and would involve a smaller risk of being incorrect.
    c. Narrower and would involve a smaller risk of being incorrect.
    d. Wider and would involve a larger risk of being incorrect.
    e. Narrower and would have the same of being incorrect.

14) In a poll,
    I. Some people refused to answer questions.
    II. People without phones could not be in the sample.
    III. Some people never answered the phone in several calls.

    Which of these possible sources of bias is included in the ± 2% margin of error announced for the poll?
    a. I only
    b. II only
    c. III only
    d. I, II, and III
    e. None of these

15) You have measured the systolic blood pressure of an SRS of 25 company employees. A 95% confidence interval for the mean systolic blood pressure for the employees of this company is (122, 138). Which of the following statements is true.

(a) 95% of the sample of employees have a systolic blood pressure between 122 and 138.

(b) 95% of the population of employees have a systolic blood pressure between 122 and 138.

(c) If the procedure were repeated many times, 95% of the resulting confidence intervals would contain the population mean systolic blood pressure.

(d) If the procedure were repeated many times, 95% of the time the population mean systolic blood pressure would be between 122 and 138.

(e) If the procedure were repeated many times, 95% of the time the sample mean systolic blood pressure would be between 122 and 138.