

## Exercise Problems on Statistical Inference for One Population Parameter

[In additions to showing your work by hands for all questions, please also use SPSS for 1.a), b) and 2.b), f), g) and print a report with SPSS output and your interpretations to verify your answers.]

1. In a study of health behavior, a random sample of 400 subjects from a major city was surveyed. In this random sample, 270 responded that they had dinner mostly after 8 PM.
  - a) At 5% level of significance, does the data support that more than 60% of the residents in this city had dinner after 8 PM?
  
  
  
  
  
  
  
  
  
  
  - b) Use this data to construct a 95% confidence interval to estimate the percentage of people in the sampled population who had dinner mostly after 8 PM.
  
  
  
  
  
  
  
  
  
  
  - c) If one wishes to estimate the percentage of people in the sampled population who had dinner mostly after 8 PM with **margin of error no more than 4%**, how large a sample is required?
  
  
  
  
  
  
  
  
  
  
  - d) If one wishes to estimate the percentage of people in the sampled population who had dinner mostly after 8 PM with **margin of error no more than 4%**, how large a sample is required? (It is believed this percentage is around 70% and will be used for the sample size estimation.)
  
  
  
  
  
  
  
  
  
  
2. A researcher hypothesized that the average heart performance score (HPS) for a certain population is **less than 7**. A random sample of subjects randomly chosen from this population was taken and data is the following:  
  
Data: 5.5, 5.8, 7.1, 4.5, 5.6, 5.1, 6.8, 6.5, 6.2
  - a) What is the proper test procedure for this analysis?
  
  
  
  
  
  
  
  
  
  
  - b) Check the normality assumption using SPSS and comment on the normality assumption using p-value.
  
  
  
  
  
  
  
  
  
  
  - c) State the hypothesis.  
  
Null hypothesis:  
  
Alternative hypothesis:

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- d) What is the value of the test statistic?
  - e) What is the decision rule? (Use either p-value approach.)
  - f) Draw a conclusion for this test using p-value approach.
  - g) Find the 95% confidence interval estimate for the average heart performance score for the sampled population.
  - h) If one wishes to estimate the average HPS for this population with a margin of error within 0.3, how large a sample would be needed? (The standard deviation is believed to be around 1.5 and is to be used for this sample size estimation.)
3. A researcher wishes to perform a one sample test for the **average weight reduction** to see if the new treatment can **reduce** the weight using a level of significance of  $\alpha = .05$ .
- a) Find the sample size so that one can have a **95%** power to reject the null hypothesis if the new treatment can actually help reducing weight by **10 lbs** on average. (The standard deviation of weight reduction measures is approximately equal 20.)
  - b) Find the sample size so that one can have a **95%** power to reject the null hypothesis if the new treatment can actually help reducing weight by **10 lbs** on average with a two-sided test. (The standard deviation of weight reduction measures is approximately equal 20.)