Exercise Problems on One Sample Statistical Inference

1. A researcher wishes to estimate the average heart performance score (HPS) for a certain population. A sample of 9 subjects randomly chosen from this population was taken and data is the following:

Data: 6.5, 5.5, 7.1, 4.5, 5.6, 5.1, 6.8, 6.6, 6.3

Mean = 6.0; S.D. = 0.87

a) Find the 95% confidence interval estimate for the average heart performance score for the sampled population.

b) If one wishes to estimate the average HPS for this population with a margin of error within 0.2, how large a sample would be needed? (The standard deviation is believed to be around 1.2 and is to be used for this sample size estimation.)
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2. In a study of health behavior, a random sample of 300 subjects from a major city was surveyed. In this random sample, 170 responded that they had dinner mostly after 8 PM.
   a) 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.
   b) 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 5%, how large a sample is required?
   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 5%, how large a sample is required? (It is believed this percentage is around 60% and will be used for the sample size estimation.)
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3. A researcher hypothesized that the average heart performance score (HPS) for a certain population is less than 7. A sample of 9 subjects randomly chosen from this population was taken and data is the following:

Data: 6.5, 5.5, 7.1, 4.5, 5.6, 5.1, 6.8, 6.6, 6.3

Mean = 6.0; S.D. = 0.87

a) What is the proper test procedure for this analysis?

c) Check the normality assumption using statistical software output of normality test and comment on the normality assumption using p-value.

d) State the hypothesis.

Null hypothesis:

Alternative hypothesis:

e) What is the value of the test statistic?

f) What is the decision rule? (Use either p-value approach.)

g) Draw a conclusion for this test using p-value approach.
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4. 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 **90%** 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 30.)

   b) Find the sample size so that one can have a **90%** 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 30.)