

Name: _____

Basic Statistics and Probability (2018-19)
Science & Engineering Program Boston University-Faculty of Science UAM

QUIZ 2

The total maximum score in this quiz is 10 points. The weight of this quiz in the final grade is 15%.

1. An automobile manufacturer who wishes to advertise that one of its models achieves at least 30 mpg (miles per gallon) decides to carry out a fuel efficiency test. Six nonprofessional drivers are selected, and each one drives a car from Phoenix to Los Angeles. The resulting fuel efficiencies (in mpg) are:

30.8 30.0 31.2 28.4 30.3 29.6

Is there enough sample evidence supporting the claim of the manufacturer that the true average fuel efficiency μ is at least 30 mpg?

- a) (0.5 points) Set up the null and alternative hypotheses that we want to test.
- b) (1 points) Of which parameters are $\bar{x} = 30.05$ and $s = 0.99$ point estimates? Use these values to compute the test statistic.
- c) (1 point) Give the rejection region for $\alpha = 0.01$.
- d) (1 point) State the appropriate conclusion in the words of the problem.
- e) (1 point) When analyzing the data with R we obtain the following result. Interpret the p-value.

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X = c(30.8, 30.0, 31.2, 28.4, 30.3, 29.6)
t.test(X,mu=30,alternative="greater")
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One Sample t-test

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data: X
t = 0.12403, df = 5, p-value = 0.4531
alternative hypothesis: true mean is greater than 30
95 percent confidence interval:
 29.23771      Inf
sample estimates:
mean of x
 30.05
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2. The fasting cholesterol level X of an individual from a certain community has mean $\mu = 200$ and standard deviation $\sigma = 20$. A sample (of size $n = 100$) is selected from this population.

a) (1 point) Determine the approximate sampling distribution of the sample mean $\bar{X} = \sum_{i=1}^{100} X_i/100$, together with its expectation $E(\bar{X})$ and standard deviation $s.d.(\bar{X})$.

b) (1.5 points) What is the approximate probability that the sample mean cholesterol level \bar{X} is lower than 201?

3. Peripheral neuropathy is a complication of uncontrolled diabetes. The number of cases of peripheral neuropathy among a group of 35 uncontrolled diabetic patients was 12. Let p be the real proportion of uncontrolled diabetics suffering peripheral neuropathy in the population.

a) (0.25 points) Give a point estimate \hat{p} of the parameter p .

b) (1.5 points) Construct a 95% confidence interval for p .

c) (1.25 points) How many uncontrolled diabetics should be randomly sampled to estimate the true proportion to within .05 with 95% confidence?