

Econ 222-01
2013-2014 Spring
Homework 1
Due Date: February 28th.

- 1) It is claimed that, among the people who drinks at least 2 liters of water every day, the percentage of those with a kidney problem is less than 5%. We suspect the truth of this statement and would like to test it:
 - a. Write, in plain English, the null and alternative hypotheses that you would use for this test
 - b. Now write the null and alternative hypotheses using mathematical notation. (State what the variable(s) you used in the above statements represent.)
- 2) We would like to test $H_1 : \mu \neq 4$ against $H_0 : \mu = 4$. The population is known to be normally distributed but the population variance is not known. In order to conduct the test, take a sample of size 16 from this population.
 - a. What is the test statistic that you would use?
 - b. What is the distribution of the test statistics (explain)?
 - c. What is the decision rule (let $\alpha = 0.05$)?
 - d. What would your conclusion be (at a significance level of 0.05), if a random sample from the population yielded the following values:
 $16, 24, 8, -3, 9, -1, -3, 22, 24, -9, 13, 11, 1, 12, -13, 15$
- 3) The file `normal_population.xls` (located at <http://www.bilkent.edu.tr/~ktarik/econ222/data.html>) contains a population which is approximately normally distributed with a standard deviation of 4 and a mean of 20. Assuming that we do not know the mean of this population we would like to test $H_1 : \mu < 21$ against $H_0 : \mu \geq 21$ at a significance level of 0.05.
 - a. Simulate the exercise of conducting the above test, by taking a sample of size 25 from the given population. Do this simulation 5000 times and find the relative frequency of the times that your test resulted with failing to reject H_0 (note that this is relative frequency of making a wrong decision).
 - b. Conduct the above simulation with a sample size of 36.
 - c. Is the result you found in the two simulations you conducted in accord with your expectations? Explain.