ECON 551 Quantitative Methods- Part 1: Probability and Statistics

Homework 6

1. The mean and standard deviation for the grade point averages (GPA) of a random sample of 36 college seniors are calculated to be 2.6 and 0.3 respectively.

(a) Find a 95% CI for the mean of the entire senior class. State your assumptions clearly.
(b) How large a sample is required if we want to be 95% confident that our estimate of μ is off (i.e. mistaken) by less than 0.05 GPA points?

2. A study was made to compare the nicotine content of two brands of cigarettes. Ten cigarettes of brand A had an average nicotine content of 3.1 mg with a sample standard deviation of 0.5 mg; eight cigarettes of brand B had an average nicotine content of 2.7 mg with a sample standard deviation of 0.7 mg. Assuming the two datasets are independent random samples from normal populations with equal variances, find a 95% CI for the true difference in the average nicotine content of the two brands of cigarette.

3. A health club claims that a new exercise program will reduce a person's waist size by 2 cm on average, over a 5-day period. The waist sizes of 6 men who participated in this program were recorded before and after. Compute a 95% CI for the mean reduction in waist size to determine the validity of the claim. Assume normal distributions. Beware that the two samples are not independent.

	1	2	3	4	5	6
before	90.4	95.5	98.7	115.9	104.0	85.6
after	91.7	93.9	97.4	112.8	101.3	84.0

4. The following are the weights of 10 packages of seeds distributed by a company: 46.4, 46.1, 45.8, 47, 46.1, 45.9, 45.8, 46.9, 45.2, 46.0. Find a 95% CI for the variance of all such packages distributed by this company, assuming a normal population.

5. In a study to estimate the proportion of residents in a certain city and its suburbs who favor the construction of a nuclear plant, it is found that 168 of 400 urban residents favor the construction while only 145 of 500 suburbans are in favor. Find a 95% CI for the difference between the proportion of urban and suburban residents who favor the construction.

6. Suppose we collect random samples of sizes n_1 and n_2, from two normal populations with means μ_1 and μ_2, respectively. The standard deviations of these two samples are s_1^2 and s_2^2. Suppose we are interested in testing whether the variances of the two populations are the same. Build a (1-α)% CI for the ratio of the two variances σ_1^2/σ_2^2.

7. Hogg and Craig, 5th edition, Exercise 6.26, page 276.

8. Hogg and Craig, 5th edition, Exercise 6.28, page 276.

9. Hogg and Craig, 5th edition, Exercise 6.42, page 287.

10. Hogg and Craig, 5th edition, Exercise 6.51, page 293.