Stat 101
Summer 2019
Dr. Lily Yen

Midterm 3

Show all your work

Name: _____

Number: _____

Signature: _____

Score: ___/39

A TI-83/84 calculator allowed.

Problem 1: Determine the critical values for a 92 % confidence interval from a standard normal distribution.

Score: /1

Problem 2: In an extensive survey, 76 % of Albertans favour the construction of a pipeline through BC. Assuming that this percentage is true, answer the following.

a. In a random sample of 1500 Albertans, find the 95 % confidence interval estimate of the population proportion p.

b. How many would we need to sample to be 98 % confident that the sample proportion is within 2 percentage points of the true population proportion?

Score: /6

Problem 3: To estimate the average number of spam e-mails each CapU student receives in a week, we randomly sample 40 students on campus. Suppose it is known that the standard deviation of this number is 8.7.

a. Find the error if we were to construct a 99 % confidence interval.

b. Find the size of a sample needed to be 99 % confident that the sample mean is within 0.5 spam e-mails of the population mean.

Score: /4

/11

Problem 4: Give the type I and type II errors that correspond with the hypothesis: "Watching another movie on Netflix won't put me over my internet download allowance." State first the null hypothesis and the alternative hypothesis.

Score: /4

Problem 5: In an effort to reduce grid lock during rush hour in North Vancouver, city planners have encouraged more people to take public transit and to join car pools. To measure the effectiveness of the campaign, the speeds of 100 motor vehicles were measured during rush hour on Highway 1. The average speed was 13 km/h. Five years ago, before the planners began their campaign, the average speed of vehicles at the same place during rush hour was 11 km/h with a standard deviation of 3 km/h. At the level of $\alpha = 0.05$, can we conclude that rush hour traffic is moving faster than 11 km/h after the city planners' advertising campaign?

a. Define your symbols.

b. State the null hypothesis.

c. State the alternative hypothesis.

d. State the test statistic and compute.

e. Draw the critical value on an appropriate graph and locate your test statistic.

f. State your conclusion using everyday language. No technical terms.

Score: /8

/12

Problem 6: A random sample of 20 international phone calls on a monthly cell phone bill shows the following duration in minutes.

17.5	28.0	38.9	68.4	86.0	99.9	108.6	69.9	16.9	27.3
59.8	10.1	35.3	74.8	87.9	110.7	46.5	18.6	95.3	88.3

Based on this sample, test at the 0.025 significance level, the claim that cell phone users talk an average of less than 100 minutes a month on international calls. Clearly state H_0 and H_1. State the test statistic used and show all steps of hypothesis testing as spelled out by the previous question.

Score: /8

/8

Problem 7: A considerable proportion of a person's time is spent working, and satisfaction with the job and satisfaction with life tend to be related. Job satisfaction is typically measured on a four-point scale: very dissatisfied, a little dissatisfied, moderately satisfied, and very satisfied. A numerical scale is created by assigning 1 to very dissatisfied, consecutively up to 4 to very satisfied.

The responses of 226 firefighters and 247 office supervisors yielded the summary statistics:

Firefighter: mean 3.673, sd 0.7235
Office Supervisor: mean 3.547, sd 0.6089

Test at the level of $\alpha = 0.02$ the claim that the mean job satisfaction of firefighters is different from the mean job satisfaction of office supervisors.

Clearly state H_0 and H_1. State the test statistic used and show all steps of hypothesis testing as spelled out by the rush hour traffic question.

Score: /8

/8