HW 11 covers chapter 9 Hypothesis testing

Please show the hypotheses, observed test statistic, p-value, decisions regarding H0 and Ha, and final conclusions in real life language.

**#1.** 9.7 on page 301, (b) only.

In order to ensure efficient usage of a server, it is necessary to estimate the mean number of concurrent users. According to records, the average number of concurrent users at100 randomly selected times is 37.7, and the standard deviation s =9.2.

(b) At the 1% significance level, do these data provide significant evidence that the mean number of concurrent users is greater than 35?

**#2.** 9.9 on page 301, (b) only

Salaries of entry-level computer engineers have a Normal distribution with unknown mean and variance. Three randomly selected computer engineers have salaries (in$1000s):

30 50 70

(b) Does this sample provide significant evidence, at a 10% level of significance, that the average salary of all entry-level computer engineers is different from $80,000?

**#3.** 9.10 on page 302, (b) only

We have to accept or reject a large shipment of items. For quality control purposes, we collect a sample of 200 items and find 24 defective items in it.

(b) The manufacturer claims that at most one in 10 items in the shipment is defective. At the 4% level of significance, do we have sufficient evidence to disprove this claim? Do we have it at the 15% level? Perform a right-tailed test.

**#4.** 9.11 on page 302

Refer to Exercise 9.10. Having looked at the collected sample, we consider an alternative supplier. A sample of 150 items produced by the new supplier contains 13 defective items. Is there significant evidence that the quality of items produced by the new supplier is higher than the quality of items in Exercise 9.10?

**#5.** 9.15 on page 302.

According to Example 9.17 on p. 257, there is no significant difference, at the 5% level, between towns A and B in their support for the candidate. However, the level α = 0.05 was chosen rather arbitrarily, and the candidate still does not know if he can trust the results when planning his campaign. Can we compare the two towns at all reasonable levels of significance? Perform a two-tailed test. The words “at all reasonable levels” mean that is in the range [0.01, 0.1].

**#6.** 9.16 on page 303 part (b). You can use either the interval obtained in (a) to draw the conclusion, or compute the p-value to make the decision.

A sample of 250 items from lot A contains 10 defective items, and a sample of 300 items from lot B is found to contain 18 defective items.

(b) At a significance level α = 0.02, is there a significant difference between the quality of the two lots?

**#7.** 9.18 on page 303 (b) only

Consider the data about the number of blocked intrusions in Exercise 8.1, p. 233.

The numbers of blocked intrusion attempt on each day during the first two weeks of the month were

56, 47, 49, 37, 38, 60, 50, 43, 43, 59, 50, 56, 54, 58

After the change of firewall settings, the numbers of blocked intrusions during the next 20 days were

53, 21, 32, 49, 45, 38, 44, 33, 32, 43, 53, 46, 36, 48, 39, 35, 37, 36, 39, 45.

(b) Can we claim a significant reduction in the rate of intrusion attempts? The number of intrusion attempts each day has approximately a Normal distribution. Perform a one-tailed test under the assumption of equal variances and without it. Does this assumption make a difference?

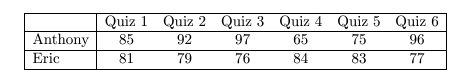
**#8**. 9.22 on page 303 (a) only

Recall Example 9.21 on p. 263, in which samples of 30 and 20 observations produced standard deviations of 0.6 min and 1.2 min, respectively. In this Example, we assumed unequal variances and used the suitable method only because the reported sample standard deviations seemed too different.

(a) Argue for or against the chosen method by testing equality of the population variances. Perform a two-tailed test.

**#9.** 9.23 on page 304.

Anthony says to Eric that he is a stronger student because his average grade for the first six quizzes is higher. However, Eric replies that he is more stable because the variance of his grades is lower. The actual scores of the two friends (presumably, independent and normally distributed) are in the table.



(a) Is there significant evidence to support Anthony’s claim? Perform a one-tailed test. Use the unpooled method.

(b) Is there significant evidence to support Eric’s claim? Perform a one-tailed test.

**#10.** The District of Columbia Opportunity Scholarship Program was created by Congress to provide tuition vouchers to low-income parents who want their child to attend a private school.

In 2012–2014, a treatment group of 995 students were randomly selected to receive a tuition

voucher, while a control group of 776 students did not receive vouchers. One year later, the

students were given a standardized reading test. The average score of the students in the treatment group was 601.78 with a standard deviation of 52.65; the average score of the control group was 605.78 with a standard deviation of 55.73.

At the level of significance, do we have enough evidence to conclude that the average

reading score of students who receive a tuition voucher to attend private school is lower than the average reading score of students who do not receive a tuition voucher?

**#11.** A vote is to be taken among the residents of a town and the surrounding county to determine whether a proposed chemical plant should be constructed. The construction site is within the town limits, and for this reason many voters in the county believe that the proposal will pass because of the large proportion of town voters who favor the construction. To determine if there is a significant difference in the proportions of town voters and county voters favoring the proposal, a poll is taken. If 120 out of 200 town voters favor the proposal and 240 out of 500 county voters favor it, would you agree that the proportion of town voters favoring the proposal is higher than the proportion of county voters? Use an level of significance.

**#12.** A study is conducted to compare the lengths of time required by men and women to assemble a certain product. Past experience indicates that the distribution of times for both mean and women is approximately normal but the variance of the times for women is less than that for men. A random sample of times for 11 mean and 14 women produced the following data

|  |  |
| --- | --- |
| women | men |
| n1 = 14 | n2 = 11 |
| s1 = 5.3 | s2 = 6.1 |

Can you conclude that variance of the times for women less than that for men?