
Review for the Final Exam

The following Review Problems cover the statistical inference and regression part of the course. You should know confidence interval estimation and hypothesis testing; Z and t tests (χ^2 optional); one tail and two tail tests; one sample and two sample tests; inferences about μ and inferences about P . Since χ^2 is optional, you may ignore problems 3, 12, 14, and 15.

Other class handouts of interest for this review:

- formula sheet
 - tables
 - the midterm review problems-
 - review problems in sampling distributions, and correlation and regression-
 - and terminology-
-

1. The following data has been collected regarding average life span of marijuana users vs. nonusers. At the $\alpha = .05$ level, is there a statistically significant difference between the average life spans of the two groups?

	<u>Nonusers</u>	<u>Users</u>
average	75.2 years	73.2 years
std.deviation	8.0 years	7.0 years
n	200	100

2. A company claims that its toasters have an average life of at least 10 years. At the .02 level of significance, test this claim using the following data: average = 9.76 years $s = 1.2$ years $n = 100$

3. Using the data below, can you conclude that there is a relationship between ability in mathematics and interest in statistics? Use $\alpha = .01$.

		<u>Ability in Mathematics</u>		
		<u>Low</u>	<u>Average</u>	<u>High</u>
<u>Interest in Statistics</u>	<u>Low</u>	63	42	15
	<u>Average</u>	58	61	31
	<u>High</u>	14	47	29

4. A school claims that the average reading score of its students is at least 70. Use the following data and assume a normal distribution. average = 68 $s = 9$ $n = 16$, (a) Test this claim at $\alpha = .05$

(b) Construct a two-sided 95% confidence interval estimate of the true average reading score.

5. Using the following data and the $\alpha = .10$ level, is there a statistically significant difference between men and women with regard to their average score on the CPA exams?

	<u>Men</u>	<u>Women</u>
average	80	84
std. deviation	16	20
n	16	15

6. A company claims that no more than 8 percent of its widgets are defective. In a sample of 100 widgets, 10 are found to be defective. (a) Should the widget production process be adjusted? Use $\alpha = .05$.

(b) Construct a 2-sided 95% confidence interval estimate of the true percentage of defective widgets.

7. I claim that my soda machine dispenses on average exactly 12 ounces of soda. Test this claim at a significance level of $\alpha = .05$, using the following data: $n = 81$ average = 12.2 oz. $s = 2.4$ oz.

8. According to a certain pharmaceutical company, cancer patients using Drug X will live at least 10 more years. Sample results show that: average = 8.8 years $s = 3.4$ years $n = 16$. (a) Test this at $\alpha = .10$

(b) Construct a 2-sided 95% CIE of the true mean, μ .

9. The director of personnel of Company XYZ would like to determine whether there is a difference in average weekly salary between married and unmarried employees. The following data are collected. At $\alpha = .03$, is there a difference between the two groups with regard to average weekly salary?

	<u>Married</u>	<u>Unmarried</u>
average	\$639.60	\$658.20
std.deviation	\$60.	\$90.
n	40	60

10. A researcher claims that at least 20% of teenagers have tried cocaine. Using the following data: $n = 500$, $x = 80$, (a) Test the claim at the $\alpha = .03$ level

(b) Construct a 2-sided 95% CIE of the true proportion that have tried cocaine.

11. The following data was obtained from patients using two different approaches to dealing with liver cancer. Can you conclude that the two approaches produce different results? What assumptions are you making? Use $\alpha = .05$.

	<u>Approach A</u>	<u>Approach B</u>
average	6.2 years	5.6 years
std.deviation	0.69 years	0.60 years
n	10	17

12. The board of directors of a labor union wishes to sample the opinions of its members. Questionnaires are sent to a random sample of members in 3 union locals. Test whether the reaction of union members to a proposed change in the union constitution is independent of the particular union local. Use $\alpha = .05$.

	<u>Union Local</u>		
<u>Reaction</u>	<u>A</u>	<u>B</u>	<u>C</u>
Favor change	18	22	10
Against change	7	14	9
Indifferent	5	4	11

13. The personnel director of a company is interested in determining whether marriage is a factor in the absenteeism rate of its male employees. Given the following data, perform a statistical test at $\alpha = .01$.

	<u>Often Absent</u>	<u>Seldom Absent</u>
Married	80	100
Unmarried	60	160

14. A morale survey, shown below, was made of three random samples drawn from different employees of a manufacturing company. Test for independence at $\alpha = .005$.

	<u>Employee Group</u>		
<u>Employee Morale</u>	<u>Office</u>	<u>Sales</u>	<u>Shop</u>
good	20	30	10
average	17	5	23
poor	13	15	17

15. A manufacturer of lawn furniture plans to introduce and sell his product for the first time in a large city. On the map, he divides the city into what he considers to be four equal sales territories. During the first week of advertising, the following number of inquiries is received from each territory. Use the goodness-of-fit test to test the hypothesis that the four territories are equally good in terms of number of inquiries. $\alpha = .05$.

<u>Sales Territory</u>	<u>Number of Inquiries</u>
Northwest	41
Southwest	45
Southeast	30
Northeast	20

16. A researcher would like to determine whether the dropout rates for two colleges are the same. At ABC College, 100 out of a sample of 400 students dropped out. At XYZ College, 150 out of 500 dropped out. Test at the .05 level of significance to see whether there is a difference between the two groups.

17. Given the data below, test the hypothesis that smokers and nonsmokers have the same average life expectancy. Use $\alpha = .01$.

	<u>Smokers</u>	<u>Nonsmokers</u>
Average life	68 years	75 years
std.deviation	10 years	12 years
n	100	200

18. The college wishes to purchase bulbs with an expected life of at least 10,000 hours. A random sample of 25 GE bulbs results in an average life of 9,900 hours with a standard deviation of 3,000 hours. Assuming normally distributed lifetimes, (a) should the bulbs be rejected? Use $\alpha = .05$.

(b) Construct a two-sided 95% confidence interval estimate about the mean, using the above data.

19. A company sells boxes of disks that are supposed to contain exactly 100 disks. A random sample of 64 boxes is taken and the mean is found to be 102 disks with a standard deviation of 5 disks. (a) Using a .02 significance level, should the disk-packing machinery be adjusted?

(b) Construct a two-sided 92% confidence interval estimate about the mean number of disks per box, using the above data.

20. Given the data below, test the hypothesis that computers manufactured by IBM and Apple have the same average customer satisfaction score. Use a significance level of .10.

	<u>IBM</u>	<u>Apple</u>
average score	80	86
std.deviation	10	14
n	15	16

=====
21. A researcher claims that at least 60% of Americans are in favor of legalizing drugs. A random sample of 100 Americans is taken and 51 are found to be in favor of legalizing drugs. (a) At the .10 significance level, should the researcher's claim be rejected?

=====
(b) Construct a two-sided 75% confidence interval estimate about the proportion using the above data.

=====
22. The manufacturers of an exterior house paint claim that the mean drying time of their product is 65 minutes. A sample, consisting of 36 cans of the paint was used to test the manufacturers' claim. The experiment yielded a mean drying time of 68 minutes, with a standard deviation of 6 minutes. Do these data provide sufficient evidence to refute the manufacturers' claim? Let $\alpha = .05$.

=====
23. A study was conducted to investigate the attitudes of retired persons toward their retirement. In a random sample of 200 retired hourly-wage employees, 140 were considered to made a satisfactory adjustment to retirement. Of 150 retired salaried employees, 90 were considered to have made a satisfactory adjustment. Do these data provide sufficient evidence to indicate that the two sampled populations differ with respect to satisfactory adjustment toward retirement? Use $\alpha = .05$.

=====
24. The standard formula for a certain brand of pig feed results in a mean weight gain of 120 pounds when fed to young pigs for three months. Company research workers have developed a new formula, which when fed to a sample of 64 pigs for three months, showed a mean weight gain of 128 pounds with a standard deviation of 16 pounds. Do these data provide sufficient evidence to indicate that the new formula produces a greater gain in weight, on the average, than the standard formula? Use $\alpha = .05$.

=====
25. In a random sample of 250 high level female employees, 62 stated that they had been sexually harassed on the job. Can one conclude from these data that less than 30 percent of the population represented by the sample have been sexually harassed on the job? Let $\alpha = .05$.

=====
26. As part of a large scale survey to investigate the health status of a population of industrial workers, a nutritionist found the mean daily protein intake of a sample of 16 subjects to be 73.8 grams. The sample standard deviation was 2.4 grams. (a) Do these data provide sufficient evidence to indicate that the mean daily protein intake of the sampled population is less than 75 grams? Let $\alpha = .05$. (b) What assumption is necessary for the hypothesis testing to be valid?

=====
27. In a random sample of 200 households in Community A, the head of the household of 40 were female. Out of 300 households in Community B, the head of household was female in 75. Can one conclude from these data that the proportion of female heads of household in the two populations is different? Let $\alpha = .05$.

=====