

Math 202: Statistics for Social Sciences**Fall 2006 FINAL EXAM****Calculator OK, 2 hours and 15 minutes.**

Instructions: There are seven parts to this exam I-VII. Please inspect the exam and make sure you have all 6 pages of questions. Do all your work on these pages. If you use the back of a page, make sure to indicate that.

Remember: *You must show your work to get proper credit.*

Academic Honesty Code: Koç University Academic Honesty Code stipulates that “copying from others or providing answers or information, written or oral, to others is cheating.” By taking this exam, you are assuming full responsibility for observing the Academic Honesty Code.

NAME: _____

Part I:	/15
Part II:	/15
Part III:	/15
Part IV:	/15
Part V:	/15
Part VI:	/15
Part VII:	/10
Total:	/100

Part I. (15 points)

1. (5 points) Fill in the blanks with the appropriate test (i. through viii.) for each situation (I through V). Some of the tests may be appropriate in several situations and some may not be used at all.

Tests:

- i. one-sample z -test
- ii. one-sample t -test
- iii. two-sample z -test
- iv. one-sample z -test for percentages (proportions)
- v. two-sample z -test for percentages (proportions)
- vi. χ^2 -test with a null hypothesis that tells you the distribution in the population
- vii. χ^2 -test for independence
- viii. F-test in ANOVA

Situations:

- I. You are drawing 80 times at random with replacement from a box. To test the hypothesis that the average of the box is 2.5, you would use _____.
- II. You are drawing 80 times at random with replacement from a box. To test the null hypothesis that the box is

1	2	3	4
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 you would use _____.
- III. You conduct a survey where each subject (randomly sampled from a single population) is asked two questions for variables 1 and 2. To test the null hypothesis that the two variables are unrelated to each other, you would use _____.
- IV. To test the null hypothesis that the population means of four different populations are equal, you would use _____.
- V. You are drawing 80 times at random from a box which contains only 0's and 1's (many 0's and many 1's). To test the null hypothesis that the percentage of 1's in the box is 40%, you would use _____.

2. a) (7 points) Perform the test in situation V and state your conclusion assuming that 27 of the 80 draws are observed to be 1's. Set up the appropriate null and alternative hypotheses first.

b) (3 points) Fill in the blanks:

“In random sampling (of many random samples), the distribution of sample percentages of 1's is approximately _____.”

“An example of a variable which may be assigned the values 0 and 1 could be _____.”

Part II. (15 points) The following table gives the Census results for the distribution of occupied housing units by number of rooms.

1. (4 points) What is the 10th percentile of the distribution for owner-occupied units?

2. (5 points) What is the average number of rooms for renter-occupied units?

3. (3 points) What is the median number of rooms for renter-occupied units?

4. (3 points) How is the distribution of renter-occupied units likely to be: skewed or symmetric? If skewed, to the right or left?

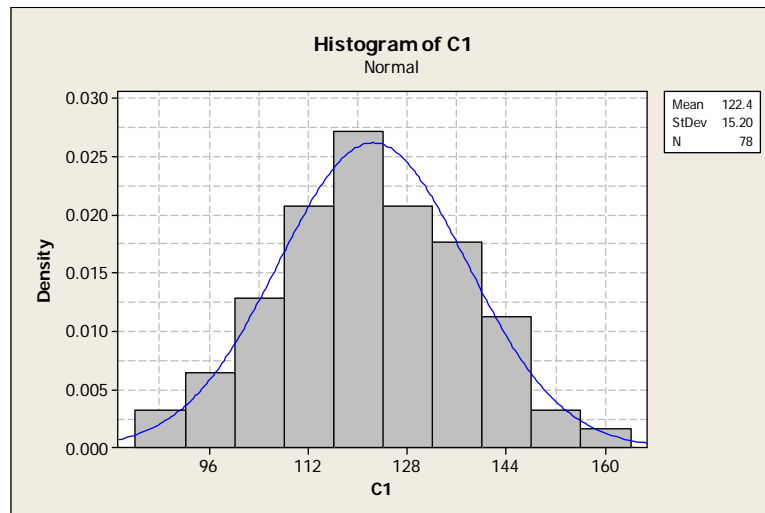
Part III. (15 points) The following are ratings of a television program by several viewers:

7.8, 7.0, 10.0, 9.1, 6.3, 7.2, 5.3, 8.0, 9.5, 9.7, 7.8, 10.0, 6.3, 5.9, 5.0, 6.1

Mean = 7.6 and Standard Deviation = 1.70

1. (3 points) What percent of the ratings is between 7 and 10?
2. (3 points) What is the 85th percentile of the ratings?
3. (7 points) Is the average rating significantly less than 9, or is the difference just due to a chance variation? Answer by performing a test of significance. Show all steps.
4. (2 points) What is your assumption about the population distribution for performing the specific test in question 3?

Part IV. (15 points) Consider the following histogram, and summary statistics for the blood pressures of subjects in a certain study.



Descriptive Statistics: C1

Variable	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
C1	78	122.36	1.72	15.20	89.67	113.16	122.14	134.04	159.90

Q1 stands for 25th percentile, Q3 stands for 75th percentile.

- (3 points) Assuming that the blood pressure follows a normal curve, estimate the percentage of the people in the population with blood pressure in the interval $[122.36 - 15.20, 122.36 + 15.20]$, that is $[107.16, 137.56]$.
- (3 points) Exactly what percent of the sample is in the interval $[132, 140]$? Hint: Use the histogram.
- (3 points) Exactly what percent of the sample is between 113.6 and 122.14? Hint: Use the Minitab output.
- (3 points) True or false: “An approximate 95% CI for the average blood pressure in the population runs between 118.92 and 125.8.”

If false, construct a 95% CI for the average blood pressure in the population.

- (3 points) Is the average blood pressure in the population contained in the confidence interval constructed in question 4? Why or why not?

Part V. (15 points) A university administrator wishes to determine whether the instructor's (education) degree is related to the students' opinion of the quality of instruction received. A frequency table of students' evaluations of various instructors is given below. At 1% level of significance, can the administrator conclude that the degree of the instructor is related to students' opinion about that instructor's effectiveness in the classroom?

Rating	Bachelor's (=university)	Master's	Doctorate
Excellent	14	9	4
Average	16	5	7
Poor	3	12	16

Part VI. (15 points) An experiment involves two random samples of newborn rats. They are tested for a specific food called "lecithin". The purpose of the experiment is to demonstrate any deficit in learning performance that results from lecithin deprivation. The score for each animal is the number of errors. The following table summarizes the data.

	Regular Diet	No-Lecithin Diet
Sample size	10	5
Sample mean	25 errors	33 errors
Sample standard deviation	250 errors	140 errors

- (3 points) If a 90% confidence interval for the difference in the number of errors of regular diet and no-lecithin diet rats were constructed, would that interval be for the difference
 - in the population
 - in the sample

Choose the correct choice and explain only in one sentence:

- (12 points) Test if the difference in the diets causes significant difference in the number of errors. Show all steps and state your conclusion.

Part VII. (10 points) The results of a study on persuasion (=ikna etme) are given in the following table. Group A listened to a persuasive (=ikna edici) message that differed only slightly from their original attitudes. For Group B, there was a moderate discrepancy (=fark) between the message and their original attitudes. For Group C, there was a large discrepancy. For each subject, the amount of change in the attitude after reading the message (on a scale of 0 to 6) was measured.

	Group A	Group B	Group C
	1	3	0
	0	4	2
	0	6	0
	2	3	4
	3	5	0
	0	3	0
	4		1
	2		
Mean	1.5	4	1
Std. dev.	1.51	1.26	1.53

Use an analysis of variance with 5% level of significance to determine whether the amount of change in the attitude differs between the three groups .

Useful formula and results:

$$\text{Between group variance: } s_B^2 = \frac{\sum n_i (\bar{x}_i - \bar{x}_{GM})^2}{k-1} = \text{Please find.}$$

$$\text{Within group variance: } s_W^2 = \frac{\sum (n_i - 1) s_i^2}{\sum (n_i - 1)} = 2.11 \quad \text{and} \quad F = \frac{s_B^2}{s_W^2}$$