



Prince Sultan University
Mathematics Department

STAT 271

Final Exam

Semester II, Term 142

Tuesday May 26, 2015

Time Allowed: **2: 00 minutes**

Student Name: _____

Student ID #: _____

Section #:

Time:

Teacher's Name: Dr. Benson

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard
6. Looking around or making an attempt to cheat will result in your exam being cancelled
7. This examination has 15 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1	10	
2,3	10,10	
4, 5	10	
6	15	
7	15	
Total	80	/80 = %

10 points

1. The diameters of steel shafts produced by a certain manufacturing process are known to have a standard deviation of $\sigma = 0.0001$ inch. A random sample of 10 shafts has an average diameter of 0.2545 inches.
 - a. Test the hypothesis that the true mean diameter equals 0.255 inches using $\alpha = 0.05$ **(5 points)**
 - b. Construct a 90 percent confidence interval on the mean diameter. **(5 points)**

2. Grades assigned by an economics instructor have historically followed a symmetrical distribution: 5% A's, 25% B's, 40% C's, 25% D's and 5% F's. This year, a sample of 150 grades was drawn and the grades (10 = A, 20 = B, 30 = C, 40 = D, and 50 = F) were recorded. Can you conclude, at the 10% level of significance, that this year's grades are distributed differently from grades in the past?

10 points

3. A market researcher for an automobile dealer intends to conduct a nationwide survey concerning car repairs. Among the questions included in the survey is the following: "What was the cost of all repairs performed on your car last year?" In order to determine the sample size necessary, the researcher needs to provide an estimate of the standard deviation. Using past experience and judgment, he estimates that the standard deviation of the amount of repairs is \$200. Suppose that a small-scale study of 20 auto owners selected at random indicates a sample standard deviation of \$237.52.
- At the 0.05 level of significance, is there evidence that the population standard deviation is different from \$200? **(4 points)**
 - Compute the p -value of this test and interpret its meaning. **(2 points)**
 - Find the 90% confidence interval for the population standard deviation of the repair cost. **(4 points)**

10 points

- 4. PGA Golf Scores** At a recent PGA tournament (the Honda classic at Palm Beach Gardens, Florida) the following scores were posted for eight randomly selected golfers for two consecutive days. At $\alpha = 0.05$, is there evidence of a difference in mean scores for the two days?

Golfer	1	2	3	4	5	6	7	8
Thursday	67	65	68	68	68	70	69	70
Friday	68	70	69	71	72	69	70	70

10 points

5. A study is conducted to determine if the percent of women who receive financial aid in undergraduate school is different from the percent of men who receive financial aid in undergraduate school. A random sample of undergraduates revealed these results.

	Women	Men
Sample size	250	300
Number receiving aid	200	180

- a. At $\alpha = 0.05$, is there significant to reject the null hypothesis of equal proportions? **(4 points)**
- b. Calculate the p -value for this test. **(3 points)**
- c. Find the 90% confidence interval of the difference in the population proportions. **(3 points)**

15 points

6. The following are the burning times of flares of two different design types. The design engineers are interested in both the mean and variance of the burning times.

Type 1		Type 2	
65	82	64	56
81	67	71	69
57	59	83	74
66	75	59	82
82	70	65	79

- a. Test the hypothesis that the two variances are equal. Use $\alpha = 0.05$. **(7 points)**
- b. Test the hypothesis that the mean burning times are equal (Assume population variances are unknown and unequal). **(8 points)**

7. The MBA program was experiencing problems scheduling its courses. The demand for the program's optional courses and majors was quite variable from one year to year to the next. In one year, students seem to want marketing courses; in the other years, accounting or finances are the rage. In desperation, the dean of the business school turned to a statistics professor for assistance. The statistics professor believed that the problem may be in the variability in the students and that the undergraduate degree affects the choice of major. As a start, he took a random sample of last year's MBA students and recorded the undergraduate degree and the major selected in the graduate program. The results were summarized in a cross-classification table, which is shown here. Can the statistician conclude that the undergraduate degree affects the choice of major? Use a 5% significance.

MBA Major				
Undergraduate Degree	Accounting	Finance	Marketing	Total
B.A	31	13	16	60
B.Eng.	8	16	7	31
B.B.A.	12	10	17	39
Other	10	5	7	22
Total	61	44	47	152