Prince Sultan University
Mathematics Department

STAT 271

First Major Exam

Fall, Term 162

Tuesday 14, 2017

Time Allowed:**90** minutes

Student Name: _____

Student ID #: _____ Section #:

Time:

Teacher 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	15	
2	15	
3	15	
4 ,5	15, 20	
Total	**80**	**/80 = %**

15 points

1. Has the recent drop in airplane passengers resulted in better on-time performance? Before the recent economic downturn, one airline bragged that 92% of its flights were on time. A random sample of 165 flights completed this year reveals that 153 were on time.
   a. Can we conclude at the 5% significance level that the airline's on-time performance has improved? **10 points**

   b. Calculate the p-value of this test. **5 points**

15 points

2. The National Club Association does periodic studies on issues important to its membership. The 2008 Executive Summary of the Club Managers Association of America reported that the average country club initiation fee was $31,912. Suppose a random sample taken in 2009 of 12 country clubs produced the following initiation fees:

$29,121	$31,472	$28,054	$31,005	$36,295	$32,771
$26,205	$33,299	$25,602	$33,726	$39,731	$27,816

Based on the sample information, can you conclude at the α = 0.05 level of significance that the average 2009 country club initiation fees are lower than the 2008 average? Conduct your test at the α = 0.05 level of significance.

20 points

3. Two machines are used for filling plastic bottles with a net volume of 16.0 ounces. The fill volume can be assumed to be normal with standard deviation $\sigma_1 = 0.020$ and $\sigma_2 = 0.025$ ounces. A member of the quality engineering staff suspects that both machines fill to the same net volume, whether or not this volume is 16.0 ounces. A random sample of 10 bottles is taken from each output of each machine.

Machine 1		Machine 2	
16.03	16.01	16.02	16.03
16.04	15.96	15.97	16.04
16.05	15.98	15.96	16.02
16.05	16.02	10.01	16.01
16.02	15.99	15.99	16.00

a. Do you think the engineer is correct? Use $\alpha = 0.05$. **10 points**

b. What is the P-value for this test? **5 points**

c. Calculate a 95% confidence interval of the difference in means. Provide a practical interpretation of this interval. **5 points**

15 points

4. Freestyle Swimmers In an effort to compare the average swimming times for two swimmers, each swimmer was asked to swim freestyle for a distance of 100 yards at randomly selected times. The swimmers were thoroughly rested between laps and did not race against each other, so that each sample of times was an independent random sample. The times for each of 10 trials are shown for the two swimmers.

Swimmer 1		Swimmer 2	
59.62	59.74	59.81	59.41
59.48	59.43	59.32	59.63
59.65	59.72	59.76	59.50
59.50	59.63	59.64	59.83
60.01	59.68	59.86	59.51

Suppose that swimmer 2 was last year's winner when the two swimmers raced. Does it appear that the average time for swimmer 2 is still faster than the average time for swimmer 1 in the 100-yard freestyle? Use $\alpha = 0.05$, and assumed equal population variances.

20 points

5. Given that $\mu = 405$, calculate the power for n = 10 and 50 for the following test. Comment on the behavior of the power as the sample size increases from 10 to 50.

H_0: $\mu = 400$
H_1: $\mu > 400$
$\alpha = .05$, $\sigma = 50$