



Prince Sultan University
STAT 271
First Examination
First Semester 2010/2011, Term 101
Sunday, 7th November 2010
Dr. Mohammed Al-Haj Ebrahim

Time Allowed: 90 minutes

Maximum points: 50 points

Name: _____
(First) (Middle) (Last)

ID Number: _____ **Serial Number:** _____

Important Instructions:

1. You may use CASIO scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You do NOT get special consideration if you forget your calculator.
4. Don't use notes or any notebook.
5. There should be NO talking during the examination.
6. Your exam will be taken immediately without any warning if your mobile is seen or heard.
7. You must show all your work beside the problem. Be organized.
8. You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.
9. This examination has **9** problems, some with several parts. Make sure that your paper has all these problems

Problem	Max points	Student's Points
1	5	
2	5	
3	8	
4	5	
5	5	
6	5	
7	5	
8	6	
9	6	
Total	50	

Q1 (5 points) Complete the following:

1. $t_{0.025, 9} = \dots\dots\dots$
 2. The critical value of a left tailed **t test** with $\alpha = 0.1$ and 20 df is $\dots\dots\dots$
 3. The approximate P-value of a right tailed **t test** with the value of test statistic 2.1 and 6 df is $\dots\dots\dots$
 4. The approximate P-value of a two tailed **t test** with the value of test statistic -1.7 and 6 d.f is $\dots\dots\dots$
 5. Suppose that a **t-test** is being conducted at the $\alpha = 0.05$ level of significance to test $H_0 : \mu = 50$ vs. $H_1 : \mu < 50$. A sample of size 20 is randomly selected from normal population. The critical value is $\dots\dots\dots$
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Q2 (5 points) Determine whether each statement is **True** or **False**

1. The chi-Square distribution is symmetric. **True / False**
2. If $\chi^2_{0.01, df} = A$ then $\chi^2_{0.99, df} > A$. **True / False**
3. As the sample size increases the t-distribution approaches the standard normal distribution. **True / False**
4. In hypotheses testing, the probability of rejecting the null hypothesis, H_0 when H_0 is false is the probability of type I error. **True / False**
5. In hypotheses testing, a type II error occurs if you do not reject the null hypothesis, H_0 when H_0 is false. **True / False**

Q3 (8 points total) A random sample of size 9 is drawn from $N(\mu, \sigma^2)$. The sample mean is equal 13 and the sample variance is equal 4.

1. **(2 points)** For testing, $H_0 : \mu = 15$ vs $H_0 : \mu < 15$, calculate the value of test statistic.
2. **(2 points)** Calculate the approximate P-value.
3. **(2 points)** At $\alpha = 0.05$, what is your conclusion.
4. **(2 points)** Construct a 95% confidence interval for μ .

Q4 (5 points) A university dean of students wishes to estimate the average number of hours students spend doing homework per week. The standard deviation of the population is 6.2 hours. How large a sample must be selected if he wants to be 99% confident that the estimate is accurate within 1.5 hours?

Q5 (5 points) A random sample of 450 students from a wide geographic area indicated that 55 attended private schools. Construct 95% confidence interval for the true proportion of students attending private schools

Q6 (5 points) A medical researcher wishes to determine the percentage of females who take vitamins. He wishes to be 99% confident that the estimate is within 2% of the true proportion. A previous study shows that 25% of the female interviewed took vitamins. Find the minimum sample size necessary.

Q7 (5 points) construct the 95% confidence interval for the variance and standard deviation for the lifetime of disposable camera batteries if a sample of 16 disposable camera batteries has a standard deviation of 2.1 months. Assume the variable is normally distributed.

Q8 (6 points total) Given the following data from a normal distribution with mean μ and variance equal to 100.

77, 85, 95, 60, 45

1. (1 point) Find the point estimate of μ .

2. (3 points) Test at $\alpha = 0.05$, $H_0 : \mu = 74$ vs $H_1 : \mu \neq 74$.

3. (2 points) Calculate the P-value

Q9 (6 points) A recent survey found that 68.6% of the population own their homes. In a random sample of 150 heads of households, 92 responded that they owned their homes. At $\alpha = 0.01$ does that suggest a difference from the national proportion?

Good Luck