Name: _____ Lab Day and Time: _____

Professor Bret Larget | Math 225, Second Practice Midterm Examination | Spring, 2001

Circle TRUE or FALSE. If the answer is FALSE, explain why.

Problem 1: TRUE or FALSE:

A sample of 20 men and 20 women is taken by randomly sampling 20 men from a population and then using their mothers as the sample of women. The appropriate statistic for estimating the standard error for the difference in sample mean serum cholesterol between men and their mothers is $s_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}$ assuming that the population standard deviation among the men is the same as among the women.

Problem 2: TRUE or FALSE:

If a population is very skewed, the sampling distribution of the sample mean may be skewed and non-normal for a sample of size 25.

Problem 3: TRUE or FALSE:

If the size of the sample doubles from 10 to 20, the exact standard deviation of the sampling distribution of $\bar{X}$ will be exactly half as big.

Problem 4: TRUE or FALSE:

If a 95% confidence interval for the mean systolic blood pressure in a population is [121.3,139.9], a correct interpretation is that approximately 95% of all individuals in the population have blood pressures between 121.3 and 139.9.

Problem 5: TRUE or FALSE:

If a 95% confidence interval for the mean systolic blood pressure in a population is [121.3,139.9], a correct interpretation is that approximately 95% of all individuals in the sample have blood pressures between 121.3 and 139.9.

Problem 6: TRUE or FALSE:

If a p-value is 0.03, this means there is only a 3% chance that the null hypothesis is true.

Problem 7: TRUE or FALSE:

If a p-value is 0.45, this is strong statistical evidence that the null hypothesis is true.

Problem 8: TRUE or FALSE:

The area between -1.96 and 1.96 under a t distribution with df degrees of freedom is approximately 95% if df is very large.

Problem 9: TRUE or FALSE:

If the null hypothesis is true then there is a 5% chance that the p-value will be smaller than 0.05.

Problem 10: TRUE or FALSE:

If the null hypothesis is rejected at $\alpha = 0.05$, then the p-value of the test statistic must be less than 0.1.

Problem 11: TRUE or FALSE:

If we a one-sided hypothesis test is significant at the $\alpha = 0.05$ level, then a two-sided hypothesis test must also be significant at the same level.

Problem 12: TRUE or FALSE:

If a 95 percent confidence interval for μ contains 0, then the probability that $\mu = 0$ is 95 percent.

Problem 13: TRUE or FALSE:

The number of ways to choose r items from k items without regarding order is $k!/r!$.

Problem 14: TRUE or FALSE:

If events A and B are independent, then $P(A|B) = P(A)$.

Problem 15: TRUE or FALSE:

The sample mean is an unbiased point estimator of the true population mean.

Problem 16: TRUE or FALSE:

The Poisson distribution is continuous.

Problem 17: TRUE or FALSE:

In a problem with two independent random samples with assumed equal variances, the pooled standard deviation (s_p) must be between the two sample standard deviations (s_1 and s_2).

Problem 18: (0 points)
Circulating levels of estrone were measured in a sample of 25 postmenopausal women following estrogen treatment. The sample mean and sample standard deviation were 73 and 16, respectively. Is there evidence that the population mean estrone level is higher than 70?

(a) State null and alternative hypotheses.

(b) Calculate a test statistic and indicate its distribution if the null hypothesis is true.

(c) Use a table to find a p-value.

(d) Is this result significant at the $\alpha = 0.05$ level?

(e) Summarize the results using plain language in the context of the problem.

Problem 19: (0 points)
The table below compares the levels of carboxyhemoglobin for a group of nonsmokers and a group of smokers. Sample means and standard deviations are given. Assume equal population variances.

Group	n	Cancer sample mean	sample standard deviation
Nonsmokers	121	$\bar{x}$=1.3	s=1.3
Smokers	75	$\bar{x}$=4.1	s=2.0

(a) State null and alternative hypotheses for a two-sided test.

(b) Calculate the test-statistic.

(c) Use a table to find a p-value.

(d) Summarize the results using plain language in the context of the problem.

Problem 20: (0 points)
A study was done to test global warming. Temperature data was gathered at 1000 randomly sampled weather stations across the world in 1950, then again in 2000. In 1950, the average temperature was 57 degrees, and in 2000, the average temperature was 57.6 degrees. The standard deviation of the paired differences was 4.1 degrees.

(a) Why is a paired test appropriate for this problem?

(b) Construct a 95 percent confidence interval for μ_d, the mean paired difference.

(c) Test the hypothesis that the mean temperatures are the same in 2000 as they were in 1950, with the alternative hypothesis that the mean temperatures are higher in 2000. State hypotheses, calculate a test statistic, use a table to find a p-value, and include a meaningful conclusion in the context of the problem.

Problem 21: (0 points)
In a study of drug abuse among adults, 55 of 219 "abusers" and 117 of 822 "nonusers" stated that they started smoking cigarettes at age 12 or younger. Do these data indicate that there is a significant difference in the proportions of abusers and nonusers who took up smoking at age 12 and younger?

Problem 22: (0 points)
Consider a study done to compare three drugs, A, B and C, for weight loss. The response variable is the weight loss after a period of time and the explanatory variable is the drug. Complete the following ANOVA table and then answer the questions that follow.

Source	Sum of Squares	dF	Mean Square	F-statistic
Among Groups	1292.4	2		
Within		128		
Total	3115.12			

(a) How many total people were sampled?

(b) What are the null and alternative hypotheses?

(c) The 95th percentile of an F distribution with 2 and 128 degrees of freedom is 3.07. Draw a conclusion in the context of the problem.

Problem 23: (0 points)
Birth weights of babies are normally distributed with a mean of 120 ounces and a standard deviation of 20 ounces.

(a) What is porportion of babies weigh more than 132 ounces at birth?

(b) In a sample of five babies, what is the probability that the mean of their weights is more than 132 ounces?

(c) In a sample of five babies, what is the probability that at least four have weights over 132 ounces?