12/1/06 MATH 171 Name:_____
Dr. Lunsford Test 2 100 Points Possible

I. Multiple Choice, True/False, Short Answer. (Multiple choice questions are 2 points each, others as indicated - 33 points total)

1. If we want to compute an 84% confidence interval for a population mean, then the value of z^* (rounded to three decimal places) will be: (circle one)

(a) 0.994 (b) 1.405 (c) 0.987 (d) None of the above

2. The test statistic for a two-sided significance test for a population mean is $z = -1.45$. What is the corresponding p-value (rounded to four decimal places)?

(a) 0.0735 (b) 0.8529 (c) 0.4265 (d) 0.1471

3. Write "true" or "false" next to each statement according to which is correct. (2 points each – 8 points total)

_____ The sample mean is always contained in a z or t confidence interval for a population mean.

_____The margin of error for a z-confidence interval for a population mean μ, based on a specified sample size n, increases as the confidence level decreases.

_____In general, averages are more variable than individual measurements.

_____In general, averages are more normal than individual measurements.

4. A taste test is given to 40 randomly chosen subjects. Each subject tastes three colas, Cola 1, Cola 2, and Cola 3, and then chooses which one they prefer. Let X be the number of subjects that choose Cola 1 as their preferred cola. Assuming the subjects are choosing their preferred cola randomly (i.e. there is no preference for one cola over the other), then X has a binomial distribution (yes, I am telling you this!) with parameters n = _____ and p = _____. (3 points each – 6 total)

5. Weight is a measure that tends to be normally distributed. Suppose the mean weight of all women at a large university is 135 pounds, with a standard deviation of 12 pounds. If you were to randomly sample 9 women at the university, there would be a 95% chance that the ***average weight of the 9 women (i.e. the sample mean weight)*** would be between: (circle one)

(a) 111 and 159 pounds. (b) 127 and 143 pounds. (c) 123 and 147 pounds.
(d) 131 and 139 pounds. (e) 133 and 137 pounds.

6. Janie believes that the average height of American women has increased and is now more than 65 inches. Let μ represent the mean height of all adult American females. What are the appropriate null and alternative hypotheses to tests Janie's belief? Clearly indicate which hypothesis is Janie's belief. (5 points)

I. Multiple Choice, True/False, Short Answer, continued.

7. The heights (in inches) of males in the U.S. are believed to be normally distributed. The average height of a random sample of 25 American adult males is found to be 69.72 inches with a standard deviation of 4.15. What is the standard error of the sample mean? (4 points)

(a) 4.15 (b) 0.166 (d) 2.04 (e) 0.83

8. The *P*-value for a hypothesis test is 0.031. At which of the following significance levels is the data statistically significant? There may be more than one correct answer, circle all that are correct. (4 points)

(a) $\alpha = 0.10$ (b) $\alpha = 0.05$ (c) $\alpha = 0.025$ (d) $\alpha = 0.01$

9. Give the definition of the *P*-value for a hypothesis test (4 points):

Problem II. The hypotheses H_0: $\mu = 150$ versus H_a: $\mu < 150$ are examined using a sample of size $n = 24$. The one-sample t statistic for the test has the value $t = -1.68$. Find the *P*-value for the test and draw a graph that clearly shows the *P*-value and the test statistic. (9 points)

Problem III. What is the smallest sample size would you need to estimate the proportion of Americans that approve of the job George Bush is doing as President of the United States with a margin of error of no more than 2% with 92% confidence? Please show all work for this computation. (9 points)

Problem IV. In a recent Newsweek Poll conducted by Princeton Survey Research Associates International on October 26-27, 2006, the following question was asked: "Do you favor or oppose using federal tax dollars to fund medical research using stem cells obtained from human embryos?" Of the 1002 randomly selected American adults sampled, 501 said they would favor, 371 said they would oppose, and 130 said they were unsure. Please answer the following. (22 points total)

(a) Using the polling data above, give a point estimate for the true proportion, p, of Americans who favor using federal tax dollars to fund medical research using stem cells obtained from human embryos. (3 points)

Symbol	Param. or Stat.?	Value (if known)
X		
n	XXXXXX	
$\hat{p}$		
p		

(b) Complete the table above (note that X is the count in the sample that favor using federal tax dollars to fund medical research using stem cells obtained from human embryos). For each symbol indicate if it is a parameter or statistic and give its value if known. If the value is unknown, indicate so in the table. (7 points)

(c) Find a 90% confidence interval for the true proportion of Americans who favor using federal tax dollars to fund medical research using stem cells obtained from human embryos. Please indicate all calculator input. (6 points)

(d) Please fill in the blanks in the following sentence: _____ percent of Americans favor using federal tax dollars to fund medical research using stem cells obtained from human embryos (based on a sample of _____American adults with a margin of error of _____ percent). Do not round your last answer to less than one decimal place. (6 points)

Problem V. Based on recent polling results, approximately 37% of Americans oppose using federal tax dollars to fund medical research using stem cells obtained from human embryos. Let p represent the proportion of Americans who are Republican and who oppose using federal tax dollars for this research. A test of the hypotheses H_0: $p = 0.37$ versus H_a: $p > 0.37$ resulted in a P-value of 0.0026. What conclusion(s) can we reach about the proportion of Republicans who oppose the research verses the proportion of all Americans who oppose? Be sure to state your conclusion in the context of this problem. (9 points)

Problem VI. Let μ be the mean number of CDs owned by college students. We will test the hypotheses: H_0: $\mu = 70$ versus H_a: $\mu > 70$. Responses from a random sample of 20 college students to the question "About how many CDs do you own?" resulted in a sample mean of 71.5 CDs with a standard deviation of 7.2 CDs. (18 points total)

(a) Which test will you use to test these hypotheses (i.e. the z-test, t-test, 1 proportion z-test, etc.) and why? You should clearly state any assumptions you make to use the test. (4 points)

(b) What are the test statistic and *P*-value of the test? Clearly indicate your answers. (4 points)

(c) Based on your answer to part (b), do you have a significant result and will you reject or fail to reject the null hypothesis? Be sure to justify your answer. (4 points)

(d) What is your conclusion of the test in the context of the problem? (6 points)