EXAM 2  Test Form Code A

Instructions:
This exam contains 33 Multiple Choice questions. Each question is worth 3 points, for a total of 99 points. One point will be given for bringing your ID to the exam as well as filling in your name, UF ID#, and test code on your scantron correctly.

Please select the best answer among the alternatives given.

You may write whatever you want on this test, but only the answers bubbled in the scantron sheet will be graded. You must submit the scantron sheet for you to receive a grade on the exam. You must show the copy of the exam to the test room proctors before turning in your scantron.

Honor pledge: "On my honor, I have neither given nor received unauthorized aid on this examination."

Signature: _______________________________________________________

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<tr>
<th>Case</th>
<th>parameter</th>
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<tr>
<td>one mean</td>
<td>$\mu$</td>
<td>$\bar{x}$</td>
<td>$\sigma/\sqrt{n}$</td>
<td>$s/\sqrt{n}$</td>
<td>$t(n-1)$</td>
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<td>one prop.</td>
<td>$p$</td>
<td>$\hat{p}$</td>
<td>$\sqrt{\frac{p(1-p)}{n}}$</td>
<td>CI: $\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$</td>
<td>z</td>
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<td>ST: $\sqrt{\frac{p_o(1-p_o)}{n}}$</td>
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$$n = \frac{\hat{p}(1-\hat{p})z^2}{m^2} \quad n = \left(\frac{zs}{m}\right)^2$$
1. Suppose that you were interested in polling University of Florida students about their opinions of how President Obama handled the government shutdown. You wanted to ask the students if they approved or disapproved of his policy about this issue. You wanted to be 95% confident and to compute a confidence interval with a 0.025 margin of error. You are uncertain what proportion of students will say that they approved. What sample size should you use?
   a) 20
   b) 39
   c) 784
   d) 1537

2. What value of t would you use for a 99% confidence interval for the population mean when the sample size was equal to 5?
   a) 4.032
   b) 4.604
   c) 7.173
   d) 5.894

3. If you increase the confidence level for a confidence interval for the population proportion, but leave everything else the same, what happens to the width of the interval?
   a) Stays the same
   b) Increases
   c) Decreases
   d) Can’t be determined

4. In 2012, the General Social Survey asked respondents if they had been harassed at work in an electronic form (such as email). Out of 1,202 people, 18 people said “often”. What is the 95% confidence interval for the population proportion of Americans that have “often” been harassed at work in an electronic form?
   a) (0.0092, 0.0206)
   b) (0.0081, 0.0218)
   c) (0.0059, 0.0239)
   d) (0.0099, 0.0199)

5. If the p-value is equal to 0.032, what decision do you make at alpha = 0.05?
   a) Reject Ha
   b) Fail to Reject Ha
   c) Reject Ho
   d) Fail to Reject Ho
6. A student researcher decided to randomly select 5 UF students and ask them questions about what they thought about raising children. One of the questions asked was “What is the ideal number of children?” Below are the results from this question. Find the 95% confidence interval for the population mean.

\[
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0 & 1 & 2 & 2 & 3 \\
\end{array}
\]

- a) (0, 3.83)
- b) (0.29, 2.91)
- c) (0.18, 3.02)
- d) (0.60, 2.60)

7. Suppose that you wanted to estimate the population mean salary of doctors living in North Florida. Suppose that a survey was done of doctor’s salaries two years ago and the standard deviation was 25,000. What size sample would you need to collect in order to make a 95% confidence interval with a margin of error of 2,000 dollars?

- a) 49
- b) 258
- c) 307
- d) 601

8. Besides random sampling, what are the conditions necessary for the sampling distribution of the sample proportion to be normally distributed?

- a) \( n \geq 30 \) and original distribution is Normally distributed
- b) \( np \geq 30 \) and \( n(1-p) \geq 30 \)
- c) \( np \geq 30 \) and \( n(1-p) \geq 30 \)
- d) \( np \geq 15 \) and \( n(1-p) \geq 15 \)
- e) \( np \geq 15 \) and \( n(1-p) \geq 15 \)

9. For the sampling distribution of the sample mean, as n increases what happens to the standard error?

- a) It increases.
- b) It decreases.
- c) It stays the same.
- d) Cannot be determined.
10. A marketing company asked respondents of a survey how many hours of tv that they had watched in the past 24 hours. The 95% confidence interval for the population mean was (1.9, 2.4). Determine if the following statement is a correct or incorrect interpretation.

“We are 95% confident that Americans watch between 1.9 and 2.4 hours of tv per day.”

a) This is a correct statement.
b) This is an incorrect statement.

11. A scientist was interested in seeing if the population proportion was more than 0.50. The test statistic equals 2.39. What would be the p-value?

a) 0.0084
b) 0.0168
c) 0.05
d) 0.50
e) 0.9916

12. An Arkansas state agency was interested in determining if there was support for a new bill. They wanted to know if more than 2/3 of the voting population of Arkansas supported the bill. What would be the appropriate null and alternative hypothesis?

a) Ho: \( \hat{p} > \frac{2}{3} \) vs. Ha: \( \hat{p} = \frac{2}{3} \)
b) Ho: p > \frac{2}{3} vs. Ha: p = \frac{2}{3}
c) Ho: \( \hat{p} = \frac{2}{3} \) vs. Ha: \( \hat{p} > \frac{2}{3} \)
d) Ho: p = \frac{2}{3} vs. Ha: p > \frac{2}{3}

13. Let p be equal to the proportion of Americans that plan on voting in the next presidential election. Suppose that p equals 0.68. If a random sample of size 300 was selected, what is the probability that the sample proportion is less than 0.60?

a) 0.0015
b) 0.0021
c) 0.9979
d) 0.9985
e) Cannot be determined

14. What would be the value of z for a 98.5% confidence interval for the population proportion?

a) 1.44
b) 2.17
c) 2.43
d) 2.451
15. In which of the following cases do you need to have random and representative samples (SRS)?
   a) Confidence intervals for the population proportion
   b) Confidence intervals for the population mean
   c) Significance test for the population proportion
   d) All of the Above
   e) None of the Above

16. Suppose that a sample of 20 college students was randomly selected. Out of these 20 students, only 1 student went to the away football game in Missouri. What would be the correct procedure for conducting a 95% confidence interval for the population proportion?
   a) Conduct a small sample confidence interval for the population proportion where 
      \( \hat{p} = \frac{x+1}{n+2} \)
   b) Conduct a small sample confidence interval for the population proportion where \( \hat{p} = \frac{x+2}{n+4} \)
   c) Conduct a small sample confidence interval for the population proportion where \( \hat{p} = \frac{x+14}{n+30} \)
   d) Conduct a large sample confidence interval for the population proportion where \( \hat{p} = \frac{x}{n} \)
   e) A confidence interval should not be made.

17. A marketing group created two new package designs (design A and design B) for a frozen chicken dinner. The marketing group asked a random selection of individuals what package they preferred. The 95% confidence interval for the population proportion that preferred design A was (0.54, 0.67). What can be said based on this interval?
   a) The population proportion that would prefer design A is likely to be between 0.54 and 0.67.
   b) The population proportion that would prefer design A is between 0.54 and 0.67.
   c) The sample proportion that would prefer design A is likely to be between 0.54 and 0.67.

18. A national organization polled a random selection of Americans and asked them if they planned on giving to charity in 2014. The 95% confidence interval of the results was (0.51, 0.81). Determine if the following statement is a correct or incorrect interpretation of the confidence interval.
   “We are 95% confident that the sample proportion of Americans that stated that they planned on giving to charity in 2014 was between 0.51 and 0.81.”
   a) This is a correct interpretation.
   b) This is an incorrect interpretation.
19. Suppose that the population mean income for K-12 instructors in Alachua County is 35,000 dollars and that the population standard deviation is 2,300 dollars. Suppose that a random sample of 35 instructors is selected. What is the probability that the sample mean is greater than 36,000 dollars?

a) 0.9949  
b) 0.6700  
c) 0.3300  
d) 0.0051

20. Mark the following statement as true or false.

“The Central Limit Theorem states that all variables will have an approximately normal distribution when the sample size is large enough.”

a) This statement is true  
b) This statement is false.

21. For the hypothesis test for the population proportion if the test statistic is close to zero, which of the following statements would be true?

a) The p-value would be big.  
b) The p-value would be small.  
c) The p-value could be big or small.  
d) The test statistic cannot be close to zero.

22. The 95% confidence interval for the population proportion of Americans that think employees should have paid leave for childcare after the birth of a new child is (0.815, 0.856). Can we conclude that more than 75% of Americans think that employees should have paid leave for childcare after birth of a new child?

a) Yes, it is likely since all of the plausible values for the sample proportion are larger than 0.75.  
b) Yes, it is likely since all of the plausible values for the population proportion are larger than 0.75.  
c) No, it is not likely since 0.75 is not in the interval, so it is not a plausible value of the population proportion.  
d) No, it is not likely since 0.75 is not in the interval, so it is not a plausible value of the sample proportion.
Questions 23 – 25 For the population of childcare workers in the state of Florida, the average salary of childcare workers is about $22,000 dollars with a standard deviation of 2,000 dollars. Suppose that a sample of 40 workers is selected.

23. What is the mean of the sampling distribution of the sample mean?
   a) 40
   b) 316.22
   c) 2,000
   d) 22,000
   e) Unknown

24. What is the standard error of the sampling distribution of the sample mean?
   a) 40
   b) 316.22
   c) 2,000
   d) 22,000
   e) Unknown

25. What is the approximate shape of the sampling distribution of the sample mean?
   a) Binomial
   b) Normal
   c) Right Skewed
   d) Left Skewed
   e) Unknown

26. The Apple Insider says that 48% of teenagers in the United States have an iPhone. Do more than 48% of Florida teens have an iPhone? A sample of 200 randomly selected Florida teens was taken. Out of 200 teenagers, 98 teenagers have an iPhone. What is the test statistic?
   a) 0.28
   b) -0.28
   c) 0.389
   d) 0.50

27. What is the margin of error for a confidence interval for the population mean?
   a) The error formed by taking biased samples.
   b) The error formed by non responses bias.
   c) The estimate of the standard error
   d) The t score times the estimate of the standard error
28. Do more than 25% of Americans disapprove of the way that the US is being governed? Gallup surveyed 1,004 randomly selected individuals at the end of September and asked this question. The p-value was 0.214. What conclusion can we make?
   a) There is no statistically significant evidence to suggest that the population proportion of Americans that disapprove of the way that the US is governed is more than 0.25.
   b) There is strong statistically significant evidence to suggest that the population proportion of Americans that disapprove of the way that the US is governed is more than 0.25.
   c) There is strong statistically significant evidence to suggest that the sample proportion of Americans that disapprove of the way that the US is governed is more than 0.25.
   d) There is no statistically significant evidence to suggest that the sample proportion of Americans that disapprove of the way that the US is governed is more than 0.25.

29. Ten people were randomly selected. Each person was asked to write down what they had eaten and the amount that they had eaten for the evening meal the day before. A nutritionist then computed the calories that they had eaten. The data is below in a box plot. Comment on the assumptions necessary to compute a 95% confidence interval for the population mean.

   a) The t distribution is robust to departures of non-normality. Conduct the confidence interval for the population mean.
   b) The population size is large. Conduct the confidence interval for the population mean.
   c) Since there is an outlier in the sample, the population distribution might not be normally distributed. Do not conduct the confidence interval for the population mean.
   d) Since there is an outlier, but the population size is large, conduct the confidence interval for the population mean.
Question 30 – 33 In the 2012 election, 53.6% of registered voters voted in the presidential election. Suppose that a sample of 75 was taken. Each person was asked if they voted in the 2012 presidential election.

30. What type of data would be collected?
   a) Quantitative
   b) Categorical

31. What would be the approximate shape of the population distribution?
   a) Binary
   b) Normal
   c) Bimodal
   d) Binomial
   e) Can’t be determined

32. What would be the approximate shape of the sample (data) distribution?
   a) Binary
   b) Normal
   c) Bimodal
   d) Binomial
   e) Can’t be determined

33. What would be the approximate shape of the sampling distribution of the sample proportion?
   a) Binary
   b) Normal
   c) Bimodal
   d) Binomial
   e) Can’t be determined