STA 2023
Fall 2012

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: __________________________

<table>
<thead>
<tr>
<th>Case</th>
<th>parameter</th>
<th>estimator</th>
<th>standard error</th>
<th>Estimate of standard error</th>
<th>Sampling Distribution</th>
</tr>
</thead>
<tbody>
<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>
</tr>
<tr>
<td>one prop.</td>
<td>$p$</td>
<td>$\hat{p}$</td>
<td>$\sqrt{p(1-p)/n}$</td>
<td></td>
<td>$z$</td>
</tr>
</tbody>
</table>

$$n = \frac{\hat{p}(1-\hat{p})z^2}{m^2} \quad n = \left(\frac{zs}{m}\right)^2$$

1. What would be the value of $z$ for a 99.56% confidence interval for the population proportion?
   a.) 0.99
   b.) 1.88
   c.) 2.01
   d.) 2.71
   e.) 2.85

$$1 - .9956 = .0044 \quad \frac{.0044}{2} = .0022$$

Look up .0022 in the middle of the z-table.

just one side
Questions 2 – 4 When the General Social Survey asked in 2004, “About how many hours per week do you spend sending and answering email?” the eight males over the age of 75 responded:

0, 1, 2, 2, 7, 10, 14, 15

2. What is the point estimate of the population mean number of hours spent sending and answering email for males over the age of 75?
   a.) 6.02
   b.) 6.375
   c.) 7
   d.) Unknown

\[ \bar{x} = 6.375 \quad \text{The point estimate for the population mean is the sample mean.} \]

3. What is the standard error of the sample mean?
   a.) 6.02
   b.) 5.63
   c.) 1.99
   d.) 2.13
   e.) 2.28

\[ \frac{s}{\sqrt{n}} = \frac{6.02}{\sqrt{8}} = 2.13 \]

4. What is the t score that would be used in a 99.8% confidence interval for the population mean?
   a.) 4.785
   b.) 4.501
   c.) 4.297
   d.) 3.091

\[ t_{df=8-1=7} \]

Look up row df = 7 and column 99.8% confidence to get 4.785.

5. If you increase the confidence level, but keep everything else the same, the width of a confidence interval will
   a.) Increase
   b.) Decrease
   c.) Stay the same
   d.) Cannot be determined.

In order to be more confident, we have to make a wider interval.

6. The reason we use a z-score from a normal distribution in constructing a large sample confidence interval for a proportion is that
   a.) For large random samples the sampling distribution of the sample proportion is approximately normal.
   b.) The population distribution is normal.
   c.) For large random samples the data distribution is approximately normal.
   d.) For any n, we use the t distribution to get a confidence interval and for large n the t distribution looks like the standard normal distribution.
   e.) All of the above.

\[ \text{categorical data} \]

\[ \text{we don't use the t for categorical data} \]
**Question 7 - 8** Suppose that we wanted to estimate the population proportion of people in Florida that were vegetarians. Suppose that we wanted to be 95% confident with a margin of error of 0.02.

\[ n = \frac{\hat{p}(1-\hat{p})z^2}{\text{error}^2} = \frac{0.5(1-0.5)1.96^2}{0.02^2} = 2401 \]

7. How large a sample do you need if you have no idea what the population proportion is?
   a.) 49
   b.) 1225
   c.) 2401
   d.) Unknown

8. If the margin of error was increased, the desired sample size would __________.
   a.) Increase
   b.) Decrease
   c.) Stay the same
   d.) Unknown

9. Mark if the following statement is true or false. (HW problem 8.117)

"If you have a volunteer sample instead of a random sample, then, a confidence interval for a parameter is still completely reliable as long as the sample size is larger than about 30."

a.) The statement is True.
   b.) The statement is False.

**Questions 10 – 11** The General Social Survey conducted a survey in 2010 that asked 2038 people the following question. "Taken all together, how would you say things are these days, very happy or not very happy? Five hundred eighty seven people said very happy. The 95% confidence interval is (0.268, 0.308). Please mark each of the interpretations as either A for Correct interpretation or B for Incorrect interpretation.

10. We are 95% confident that the population proportion of Americans that are very happy is between 0.268 and 0.308.
   a.) The statement is a Correct Interpretation
   b.) The statement is an Incorrect Interpretation.

11. The probability that the population proportion is in a 95% confidence interval is 0.95.
   a.) The statement is a Correct Interpretation
   b.) The statement is an Incorrect Interpretation.
Questions 12 – 14 Only about 16% of all Americans have blue eyes. Suppose that we took a random sample of 200 people.

12. What type of data would be collected?
   a.) Quantitative
   b.) Categorical
   Data: blue eyes or not

13. Find the mean and the standard error of the sampling distribution of the sample proportion with blue eyes.
   a.) Mean = 32  
   b.) Mean = 0.16  
   c.) Mean = 32  
   d.) Mean = 0.16  
   e.) Both are unknown
   Standard error = 5.18
   Standard error = 0.0259
   Standard error = 0.0259
   Standard error = 5.18

14. What is the approximate shape of the sampling distribution of the sample proportion of Americans with blue eyes?
   a.) Normal
   b.) Binomial
   c.) Bimodal
   d.) Unknown
   np = 200(0.16) = 32
   n(1-p) = 200(1-0.16) = 168
   so \( \hat{p} \sim N \)

15. The central limit theorem implies
   a.) The sampling distribution of the sample mean looks more like the population distribution as the sample increases.
   b.) For sufficiently large random samples, the sampling distribution of \( \bar{x} \) is approximately normal, regardless of the shape of the population distribution.
   c.) Population distributions are normal whenever the population size is large.
   d.) All variables have approximately bell shaped data distributions if a random sample contains at least about 30 observations.
   e.) All of the above.

No, the sampling distribution looks more Normal as \( n \) increases.

No, the data distribution can be any shape.

It is the sampling distribution that becomes normal if \( n \) is large.

No, the population distribution can be any shape.
Questions 16 – 17 The daily sales for a local restaurant follow a probability distribution with a mean of $1230.00 and a standard deviation of $445.00.

16. What is the most likely shape of the population distribution of daily sales?
   a.) Binomial
   b.) Normal
   c.) Right Skewed
   d.) Left Skewed

17. Suppose that n = 5, what is the approximate shape of the sampling distribution of sample mean daily sales?
   a.) Binomial
   b.) Normal
   c.) Right Skewed
   d.) Left Skewed
   e.) Unknown

18. An estimate is needed of the mean salary of accountants in Gainesville. A 95% confidence interval should have a margin of error of $2,000. Suppose that accountant salaries range from $30,000 to $120,000. About how large a sample of accountants is needed?
   a.) 15
   b.) 89
   c.) 217
   d.) 344

Questions 19 - 20 A college student is interested in estimating the average salary of graduates of UF. He takes a random sample of 30 alumni who have graduated in the past year. He computes a 95% confidence interval for the average starting salary and finds that it is ($45019, $67887). Please mark each of the interpretations as either A for Correct interpretation or B for Incorrect interpretation.

19. We are 95% confident that all starting salaries for recent graduates is between $45,019 and $67,887.
   a.) The statement is a Correct Interpretation
   b.) The statement is an Incorrect Interpretation.

20. For 95% of samples, the population proportion will be between $45019 and $67887.
   a.) The statement is a Correct Interpretation
   b.) The statement is an Incorrect Interpretation.
21. What is the correct decision for a p-value = 0.075?
   a.) Reject Ho at all common levels of \( \alpha \)
   b.) Fail to Reject Ho at all common levels of \( \alpha \)
   c.) Reject Ho at \( \alpha \) of 0.05 and 0.10, but not at 0.01
   d.) Reject Ho at \( \alpha \) of 0.10, but not 0.05 and 0.01
   e.) Reject Ho at \( \alpha \) of 0.05, but not at 0.10 or at 0.01

22. For a test of Ho: \( p = 0.75 \) vs. Ha: \( p < 0.75 \), the z test statistic equals -1.14
    Find the p-value.
    a.) 0.1271
    b.) 0.2266
    c.) 0.2542
    d.) 0.7734
    e.) 0.8729

23. A Gallup Poll in October 2012 estimated that 7.4% of Americans were unemployed. This estimate was based surveying 30,000 people and asking about their employment status.

24. For a 95% confidence interval for the population proportion of Americans that are unemployed, what is the standard error?
    a.) 0.0015
    b.) 0.0030
    c.) 0.0045
    d.) almost zero

24. Besides needing categorical data, what are the required assumptions for the 95% confidence interval for the population proportion of Americans that are unemployed?
   i.) Normal Distribution of data.
   ii.) Sample Size is greater than or equal to 15.
   iii.) Sample Size is greater than or equal to 30.
   iv.) \( np_0 \) and \( n(1-p_0) \) greater than or equal to 15.
   v.) \( \hat{p} \) and \( (1 - \hat{p}) \) greater than or equal to 15.
   vi.) Random Sampling

   a.) i, v
   b.) i, v, vi
   c.) i, iv, vi
   d.) v and vi
   e.) iv and vi
Questions 25 – 27 The original version of the quantitative portion of the GRE had scores that had a normal distribution with a mean of 590 and a standard deviation of 30.

25. A test taker is selected at random. Find the probability that the test taker’s score is less than 610.
   a.) 0.24
   b.) 0.2514
   c.) 0.66
   d.) 0.7486
   e.) Cannot be determined

26. A random sample of 15 test takers is obtained. Find the probability that the sample mean score is less than 600.
   a.) 0.33
   b.) 0.6293
   c.) 0.8708
   d.) 0.9015
   e.) Cannot be determined.

27. If n equals 15, between what two values would you find the central 95% of sample means?
   a.) 560 to 620
   b.) 530 to 650
   c.) 582.25 to 597.75
   d.) 574.51 to 605.49
   e.) Cannot be determined

28. In 1988, sixty eight percent of people voted in the elections in India. Suppose that a random sample of 100 people was selected and that the same percentage of people vote today in India. What is the probability that the sample proportion of people that vote is greater than 0.72?
   a.) 0.9842
   b.) 0.8051
   c.) 0.1949
   d.) 0.0094
   e.) Cannot be determined
Questions 29 - 30 For each of the following, is the statement a null hypothesis or an alternative hypothesis? (Homework problem 9.1)

29. “In Canada, the proportion of adults who favor legalizing gambling equals 0.50.”
   a.) This is a null hypothesis.
   b.) This is an alternative hypothesis.

30. “The proportion of all Canadian college students who are regular smokers is less than 0.24, the value that it was 10 years ago.”
   a.) This is a null hypothesis.
   b.) This is an alternative hypothesis.

Questions 31 - 33 Texting and driving is very dangerous. About 47% of adults admit to texting and driving. A new ad campaign runs for 6 weeks to stress the importance of not texting and driving. Is the new campaign effective? Two hundred adults are randomly selected and asked if they have texted while driving in the past week. Eighty eight of the adults say that they have texted while driving in the past week.

31. What does “p” stand for in this problem?
   a.) Sample proportion of people who have texted while driving after the ad campaign
   b.) Population proportion of people who have texted while driving after the ad campaign
   c.) The probability that the test statistic would be this extreme or more extreme if the null hypothesis was known
   d.) The probability that test statistic equals 0.50.

32. What is the correct alternative hypothesis for this situation?
   a.) Ha: p < 0.47
   b.) Ha: \( \hat{p} < 0.47 \)
   c.) Ha: p < 0.50
   d.) Ha: \( \hat{p} < 0.50 \)

33. Compute the test statistic for this problem.
   a.) -0.85
   b.) 0.85
   c.) 0.20
   d.) 0.47
   e.) 1.96

\[
T S = \frac{(0.44 - 0.47)}{\sqrt{\frac{(0.47)(1-0.47)}{200}}} = -0.85
\]