Questions 1 – 6 A recent survey of 30 UF students asked them how many servings of fruits and vegetables they consumed on a typical day. The mean was 2.63 and the standard deviation was 2.17.

1. The two numbers that appear in bold are:
   a) Both parameters.
   b) Both statistics.
   c) A parameter and a statistic respectively.
   d) A statistic and a parameter respectively.
   e) None of the above.

2. Construct a 95% confidence interval for μ.
   a) (1.61, 3.65)
   b) (1.98, 3.28)
   c) (1.80, 7.06)
   d) (1.62, 6.88)
   e) (1.82, 3.44)

3. In this problem μ represents the average number of servings of fruits and vegetables consumed on a typical day by:
   a) all UF students, which is 2.63.
   b) all students in the sample, which is 2.63.
   c) all UF students, which is unknown.
   d) all students in the sample, which is unknown.
   e) these 30 students, which is 2.63.

4. Are there any problems with the assumption of randomness?
   a) No problem - it is a random sample because we are only extending conclusions to UF students.
   b) No problem - it is a random sample because the numbers seem representative of the population.
   c) There is a problem - it would be absolutely impossible to take a true random sample of UF students.
   d) The sample size of 30 is large enough that we don’t need to worry about that assumption.
   e) We need more information about how exactly the data was collected to determine this.

5. Are there any problems with the assumption of Normality for the original distribution?
   a) No problem - X is Normal because the mean and standard deviation are given.
   b) No problem - X is Normal because the CLT guarantees so for a sample size of 30 or more.
   c) There is a problem - X does not appear to be Normal based on the mean and standard deviation given.
   d) The sample size of 30 is large enough that we don’t need to assume X has a Normal distribution.
   e) We need more information about how exactly the data was collected to determine this.

6. Can we say the Sampling Distribution of $\bar{X}$ is approximately Normal?
   a) Yes, $\bar{X}$ is approximately Normal because the mean and standard deviation are given.
   b) Yes, $\bar{X}$ is approximately Normal because the CLT guarantees so for a sample size of 30 or more.
   c) No, $\bar{X}$ does not appear to be Normal based on the mean and standard deviation given.
   d) The sample size of 30 is large enough that we don’t need to assume $\bar{X}$ has a Normal distribution.
   e) We need more information about how exactly the data was collected to determine this.
7. The Bootstrap Confidence Interval differs from other confidence interval methods we've learned in class mainly in that:
   a) It makes inferences about statistics instead of parameters.
   b) It does not require any assumptions of randomness. ☒
   c) It does not require any particular shape for the sampling distribution. ☑
   d) It can be done easily by hand instead of requiring a computer. ✗
   e) All of the above.

Questions 8 – 11 In the past few weeks, as the results of the presidential primaries are released with Donald Trump emerging as the frontrunner for the Republican party, searches for “how can I move to Canada” have spiked higher than at any time in Google’s history. This type of reaction is common on election years, but most people that look up this information or say they would consider leaving the US never follow through with it. Suppose 25% of Americans are pondering a move to Canada if Trump becomes president. Now consider taking a random sample of 500 Americans to ask them that question and computing the proportion in the sample that says yes.

8. Are the conditions necessary for the sampling distribution of \( \hat{p} \) to be Normal satisfied?
   a) Yes, since we expect 125 people to say yes and 375 to say no.
   b) Yes, since there are over 30 people in the sample.
   c) Yes, since we can go three standard deviations left and right of the mean.
   d) Yes, since there are no outliers in the data.
   e) All of the above.

9. What are the mean and standard error of the sampling distribution of \( \hat{p} \)?
   a) 125 and 9.68
   b) 500 and 0.25
   c) 0.25 and 0.019
   d) 375 and 12.5
   e) Impossible to tell.

10. What is the probability that less than 20% in the sample say they are pondering a move to Canada.
    a) 0.2630
    b) 0.0043
    c) 0.0097
    d) 0.7370
    e) 0.9957

11. If we wanted to estimate the proportion of UF students who are pondering a move to Canada to within 0.01 of the true proportion, with 95% confidence, how many students would we need to sample?
    a) 7203
    b) 3675
    c) 73
    d) 37
    e) 368

12. Which of the following is NOT a topic or procedure we have learned in this class?
    a) Confidence Interval for a Population Mean. ☑
    b) Sampling Distribution of a Sample Proportion. ☑
    c) Determining Sample Size for a Confidence Interval for a Population Mean. ☑
    d) Bootstrap Confidence Interval for a Population Median. ✗
    e) Significance Test for a Sample Proportion. ✗
Questions 13 – 22

Do the majority of American adults believe it is ok to live together with a partner without getting married? In 2012 the General Social Survey asked how they felt about the statement: “It is alright for a couple to live together without intending to get married.” Out of 1294 people 711 said they agreed or strongly agreed with that statement.

\[ \hat{p} = \frac{711}{1294} = 0.5495 \]

13. Construct a 95% confidence interval for the proportion of Americans who would say it is alright for a couple to live together without intending to get married.

a) (0.516, 0.587)  
\( \hat{p} \pm z_{0.95} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \)

\[ 0.5495 \pm 1.96 \sqrt{\frac{0.5495(0.4505)}{1294}} \]

b) (0.522, 0.577)

c) (0.543, 0.556)

d) (0.549, 0.550)

e) (0.531, 0.569)

14. Based on this confidence interval we can say that the population proportion of Americans who would say it is alright for a couple to live together without intending to get married:

a) is exactly 50%  

b) could be 50%  

c) is not 50%  

d) is less than 50%  

e) is more than 50%

15. To determine if the majority of Americans (that is, more than half) would say it is alright for a couple to live together without intending to get married we should write the hypotheses as:

a) Ho: \( p = 0.5 \)  
Ha: \( \hat{p} > 0.5 \)

b) Ho: \( p = 0.5 \)  
Ha: \( \hat{p} < 0.5 \)

c) Ho: \( \hat{p} = 0.5495 \)  
Ha: \( \hat{p} > 0.5 \)

d) Ho: \( p = 0.5 \)  
Ha: \( p < 0.5 \)

e) Ho: \( \hat{p} = 0.5 \)  
Ha: \( \hat{p} < 0.5 \)

Match the following symbols with their value for this test:

2. \( p \)  
3. \( \hat{p} \)

4. \( p_0 \)

5. \( \sigma \)

6. \( n \)

21. The standard error of the test statistic to conduct that test is:

a) the same as the standard error for making a confidence interval for \( p \)

b) not the standard error for making a confidence interval for \( p \)

c) the same as the standard error for making a confidence interval for \( \mu \)

d) not the standard error for making a confidence interval for \( \mu \)

e) none of the above

22. The attitudes towards living together have changed quite a bit in the past decades. The same question was asked in 1994, and 587 out of 1422 respondent saying they agreed or strongly agreed that it is alright for a couple to live together without intending to get married was. The test statistic to determine if more than 40% of Americans felt that way in 1994 was \( z = 0.99 \). The p-value for this test is:

a) 0.8389

b) 0.7670

c) 0.3222

d) 0.2330

e) 0.1611

23. What is the value of \( z \) needed to make a 91% confidence interval?

a) 1.66

b) 1.59

c) 1.70

d) 1.34

e) 1.77
Questions 24 – 29 The Democratic frontrunner for the presidential nomination is Hillary Clinton. She is seen by many as an “establishment” candidate and a Washington insider. A poll conducted by ABC News/Washington Post on March 3-6, 2016 surveyed 1,000 adults nationwide and asked them the question: "Overall, do you have a favorable or unfavorable impression of Hillary Clinton?" 52% of respondents said they had an unfavorable impression of her. We constructed a 95% confidence interval for \( p \), the proportion of American adults who feel this way: \((0.49, 0.55)\). Assuming all necessary conditions are satisfied, determine if the following interpretations are True or False.

24. 95% of all Americans believe that the percentage of people with an unfavorable impression of Hillary Clinton is between 49% and 55%.
   a) True  b) False

25. We are 95% confident that the proportion of Americans in the sample that has an unfavorable impression of Hillary Clinton is between 49% and 55%.
   a) True  b) False

26. We are 95% confident that the proportion of Americans in the population that has an unfavorable impression of Hillary Clinton is between 49% and 55%.
   a) True  b) False

27. There is a 95% probability that the proportion of Americans in the sample with an unfavorable impression of Hillary Clinton is between 49% and 55%.
   a) True  b) False

28. The probability that \( p \) is included in a 95% confidence interval is .95.
   a) True  b) False

29. The probability that \( p \) is between 0.49 and 0.55 is .95.
   a) True  b) False

30. A study of 50 college students who own motorcycles or scooters found that only 6 of them always wear a helmet when riding it. Can we construct a confidence interval for the true proportion of college students that do?
   a) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.12 \).
   b) Yes, by using the t confidence interval formula with \( \hat{p} = 0.1115 \).
   c) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.154 \).
   d) Yes, by using the t confidence interval formula with \( \hat{p} = 0.111 \).
   e) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.148 \).

31. We take repeated random samples from a population, all of the same size \( n \), compute the sample mean from each one and plot them. This is a description of:
   a) the Sampling Distribution of \( \mu \)
   b) the Sampling Distribution of \( \bar{X} \)
   c) the Bootstrap Distribution of \( \mu \)
   d) the Bootstrap Distribution of \( \bar{X} \)
   e) none of the above

32. If the p-value for a test is 0.07, we say that there is:
   a) some evidence for the alternative hypothesis.
   b) pretty strong evidence for the alternative hypothesis.
   c) not enough evidence for the null hypothesis.
   d) some evidence for the null hypothesis.
   e) pretty strong evidence for the null hypothesis.

33. If the p-value for a test is 0.04 then:
   a) we can reject the null hypothesis at \( \alpha = 0.10 \) and 0.05 but not at 0.01
   b) we can reject the null hypothesis at \( \alpha = 0.01 \) and 0.05 but not at 0.10
   c) we can reject the alternative hypothesis at \( \alpha = 0.10 \) and 0.05 but not at 0.01
   d) we can reject the alternative hypothesis at \( \alpha = 0.01 \) and 0.05 but not at 0.10
   e) we can reject the alternative hypothesis at \( \alpha = 0.10 \) and the null at \( \alpha = 0.01 \)
Honor pledge: "On my honor, I have neither given nor received unauthorized aid on this examination."

SIGN your name in this box in INK
Write your UFID number

Questions 1 – 10

Do the majority of American adults believe it is ok to live together with a partner without getting married? In 2012 the General Social Survey asked how they felt about the statement: “It is alright for a couple to live together without intending to get married.” Out of 1294 people 711 said they agreed or strongly agreed with that statement.

1. Construct a 95% confidence interval for the proportion of Americans who would say it is alright for a couple to live together without intending to get married.
   a) (0.543, 0.556)
   b) (0.549, 0.550)
   c) (0.522, 0.577)
   d) (0.531, 0.569)
   e) (0.516, 0.587)

2. Based on this confidence interval we can say that the population proportion of Americans who would say it is alright for a couple to live together without intending to get married:
   a) is less than 50%  
   b) is more than 50%
   c) is not 50%
   d) is exactly 50%
   e) could be 50%

3. To determine if the majority of Americans (that is, more than half) would say it is alright for a couple to live together without intending to get married we should write the hypotheses as:
   a) Ho: \( \hat{p} = 0.5495 \)  Ha: \( \hat{p} > 0.5495 \)
   b) Ho: p = 0.5  Ha: p > 0.5
   c) Ho: p = 0.5  Ha: \( \hat{p} = 0.5495 \)
   d) Ho: \( \hat{p} = 0.5495 \)  Ha: p = 0.5
   e) Ho: \( \hat{p} = 0.5 \)  Ha: \( \hat{p} > 0.5 \)

Match the following symbols with their value for this test:

- 4. \( \alpha \)
- 5. \( \alpha \)
- 6. \( n\)
- 7. \( \alpha \)
- 8. \( \hat{p} \)
- \( \hat{p} \)

9. The standard error of the test statistic to conduct that test is:
   a) the same as the standard error for making a confidence interval for \( \mu \)
   b) the same as the standard error for making a confidence interval for \( p \)
   c) different from the standard error for making a confidence interval for \( \mu \)
   d) different from the standard error for making a confidence interval for \( p \)
   e) none of the above

10. The attitudes towards living together have changed quite a bit in the past decades. The same question was asked in 1994, and 587 out of 1422 respondent saying they agreed or strongly agreed that it is alright for a couple to live together without intending to get married was. The test statistic to determine if more than 40% of Americans felt that way in 1994 was \( z = 0.99 \). The p-value for this test is:
   a) 0.1611
   b) 0.8389
   c) 0.7670
   d) 0.3222
   e) 0.2330
11. A study of 50 college students who own motorcycles or scooters found that only 6 of them always wear a helmet when riding it. Can we construct a confidence interval for the true proportion of college students that do?
   a) Yes, by using the t confidence interval formula with \( \hat{p} = 0.111 \).
   b) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.148 \).
   c) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.12 \).
   d) Yes, by using the t confidence interval formula with \( \hat{p} = 0.1115 \).
   e) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.154 \).

12. Which of the following is NOT a topic or procedure we have learned in this class?
   a) Determining Sample Size for a Confidence Interval for a Population Mean.
   b) Bootstrap Confidence Interval for a Population Median.
   c) Significance Test for a Sample Proportion.
   d) Confidence Interval for a Population Mean.
   e) Sampling Distribution of a Sample Proportion.

13. We take repeated random samples from a population, all of the same size n, compute the sample mean from each one and plot them. This is a description of:
   a) the Sampling Distribution of \( \mu \)
   b) the Bootstrap Distribution of \( \bar{x} \)
   c) the Sampling Distribution of \( \bar{x} \)
   d) the Bootstrap Distribution of \( \mu \)
   e) none of the above

14. Bootstrap Confidence Intervals differ from other confidence interval methods we’ve learned in class mainly in that:
   a) It can be done easily by hand instead of requiring a computer.
   b) It does not require any assumptions of randomness.
   c) It does not require any particular shape for the sampling distribution.
   d) It makes inferences about statistics instead of parameters.
   e) All of the above.

Questions 15 – 20 The Democratic frontrunner for the presidential nomination is Hillary Clinton. She is seen by many as an "establishment" candidate and a Washington insider. A poll conducted by ABC News/Washington Post on March 3-6, 2016 surveyed 1,000 adults nationwide and asked them the question: "Overall, do you have a favorable or unfavorable impression of Hillary Clinton?" 52% of respondents said they had an unfavorable impression of her. We constructed a 95% confidence interval for \( p \), the proportion of American adults who feel this way: (0.49, 0.55).

Assuming all necessary conditions are satisfied, determine if the following interpretations are True or False.

15. There is a 95% probability that the proportion of Americans in the sample with an unfavorable impression of Hillary Clinton is between 49% and 55%.
   a) True  b) False

16. 95% of all Americans believe that the percentage of people with an unfavorable impression of Hillary Clinton is between 49% and 55%.
   a) True  b) False

17. We are 95% confident that the proportion of Americans in the population that has an unfavorable impression of Hillary Clinton is between 49% and 55%.
   a) True  b) False

18. The probability that \( p \) is included in a 95% confidence interval is .95.
    a) True  b) False

19. The probability that \( p \) is between 0.49 and 0.55 is .95.
    a) True  b) False

20. We are 95% confident that the proportion of Americans in the sample that has an unfavorable impression of Hillary Clinton is between 49% and 55%.
    a) True  b) False
21. If the p-value for a test is 0.07, we say that there is:
   a) pretty strong evidence for the null hypothesis.
   b) some evidence for the alternative hypothesis.
   c) pretty strong evidence for the alternative hypothesis.
   d) not enough evidence for the null hypothesis.
   e) some evidence for the null hypothesis.

22. If the p-value for a test is 0.04 then:
   a) we can reject the alternative hypothesis at \( \alpha = 0.10 \) and 0.05 but not at 0.01
   b) we can reject the alternative hypothesis at \( \alpha = 0.01 \) and 0.05 but not at 0.10
   c) we can reject the alternative hypothesis at \( \alpha = 0.10 \) and the null at \( \alpha = 0.01 \)
   d) we can reject the null hypothesis at \( \alpha = 0.10 \) and 0.05 but not at 0.01
   e) we can reject the null hypothesis at \( \alpha = 0.01 \) and 0.05 but not at 0.10

Questions 23 – 26 In the past few weeks, as the results of the presidential primaries are released with Donald Trump emerging as the frontrunner for the Republican party, searches for “how can I move to Canada” have spiked higher than at any time in Google’s history. This type of reaction is common on election years, but most people that look up this information or say they would consider leaving the US never follow through with it. Suppose 25% of Americans are pondering a move to Canada if Trump becomes president. Now consider taking a random sample of 500 Americans to ask them that question and computing the proportion in the sample that says yes.

23. Are the conditions necessary for the sampling distribution of \( \hat{p} \) to be Normal satisfied?
   a) Yes, since we can go three standard deviations left and right of the mean.
   b) Yes, since there are no outliers in the data.
   c) Yes, since we expect 125 people to say yes and 375 to say no.
   d) Yes, since there are over 30 people in the sample.
   e) All of the above.

24. What are the mean and standard error of the sampling distribution of \( \hat{p} \)?
   a) 0.25 and 0.019
   b) 125 and 9.68
   c) 500 and 0.25
   d) 375 and 12.5
   e) Impossible to tell.

25. What is the probability that less than 20% in the sample say they are pondering a move to Canada.
   a) 0.9957
   b) 0.2630
   c) 0.0043
   d) 0.7370
   e) 0.0097

26. If we wanted to estimate the proportion of UF students who are pondering a move to Canada to within 0.01 of the true proportion, with 95% confidence, how many students would we need to sample?
   a) 3675
   b) 73
   c) 37
   d) 7203
   e) 368
27. What is the value of $z$ needed to make a 91% confidence interval?
   a) 1.59
   b) 1.70
   c) 1.34
   d) 1.77
   e) 1.66

Questions 28–33 A recent survey of 30 UF students asked them how many servings of fruits and vegetables they consumed on a typical day. The mean was 2.63 and the standard deviation was 2.17.

28. The two numbers that appear in bold are:
   a) A statistic and a parameter respectively.
   b) A parameter and a statistic respectively.
   c) Both statistics.
   d) Both parameters.
   e) None of the above.

29. Construct a 95% confidence interval for $\mu$.
   a) (1.80, 7.06)
   b) (1.62, 6.88)
   c) (1.61, 3.65)
   d) (1.98, 3.28)
   e) (1.82, 3.44)

30. In this problem $\mu$ represents the average number of servings of fruits and vegetables consumed on a typical day by:
   a) these 30 students, which is 2.63.
   b) all students in the sample, which is 2.63.
   c) all students in the sample, which is unknown.
   d) all UF students, which is unknown.
   e) all UF students, which is 2.63.

31. Are there any problems with the assumption of randomness?
   a) We need more information about how exactly the data was collected to determine this.
   b) There is a problem - it would be absolutely impossible to take a true random sample of UF students.
   c) The sample size of 30 is large enough that we don’t need to worry about that assumption.
   d) No problem - it is a random sample because we are only extending conclusions to UF students.
   e) No problem - it is a random sample because the numbers seem representative of the population.

32. Are there any problems with the assumption of Normality for the original distribution?
   a) We need more information about how exactly the data was collected to determine this.
   b) There is a problem- $X$ does not appear to be Normal based on the mean and standard deviation given.
   c) The sample size of 30 is large enough that we don’t need to assume $X$ has a Normal distribution.
   d) No problem - $X$ is Normal because the mean and standard deviation are given.
   e) No problem - $X$ is Normal because the CLT guarantees so for a sample size of 30 or more.

33. Can we say the Sampling Distribution of $\bar{X}$ is approximately Normal?
   a) We need more information about how exactly the data was collected to determine this.
   b) No, $\bar{X}$ does not appear to be Normal based on the mean and standard deviation given.
   c) The sample size of 30 is large enough that we don’t need to assume $\bar{X}$ has a Normal distribution.
   d) Yes, $\bar{X}$ is approximately Normal because the mean and standard deviation are given.
   e) Yes, $\bar{X}$ is approximately Normal because the CLT guarantees so for a sample size of 30 or more.
Questions 1 – 6 The Democratic frontrunner for the presidential nomination is Hillary Clinton. She is seen by many as an “establishment” candidate and a Washington insider. A poll conducted by ABC News/Washington Post on March 3-6, 2016 surveyed 1,000 adults nationwide and asked them the question: "Overall, do you have a favorable or unfavorable impression of Hillary Clinton?" 52% of respondents said they had an unfavorable impression of her. We constructed a 95% confidence interval for $p$, the proportion of American adults who feel this way: (0.49, 0.55). Assuming all necessary conditions are satisfied, determine if the following interpretations are True or False.

1. The probability that $p$ is included in a 95% confidence interval is .95.  
   a) True  b) False

2. The probability that $p$ is between 0.49 and 0.55 is .95.  
   a) True  b) False

3. We are 95% confident that the proportion of Americans in the population that has an unfavorable impression of Hillary Clinton is between 49% and 55%.  
   a) True  b) False

4. There is a 95% probability that the proportion of Americans in the sample with an unfavorable impression of Hillary Clinton is between 49% and 55%.  
   a) True  b) False

5. 95% of all Americans believe that the percentage of people with an unfavorable impression of Hillary Clinton is between 49% and 55%.  
   a) True  b) False

6. We are 95% confident that the proportion of Americans in the sample that has an unfavorable impression of Hillary Clinton is between 49% and 55%.  
   a) True  b) False

7. Which of the following is NOT a topic or procedure we have learned in this class?
   a) Bootstrap Confidence Interval for a Population Median.
   b) Significance Test for a Sample Proportion.
   c) Confidence Interval for a Population Mean.
   d) Sampling Distribution of a Sample Proportion.
   e) Determining Sample Size for a Confidence Interval for a Population Mean.

8. A study of 50 college students who own motorcycles or scooters found that only 6 of them always wear a helmet when riding it. Can we construct a confidence interval for the true proportion of college students that do?
   a) Yes, by using the $Z$ confidence interval formula with $\hat{p} = 0.148$.
   b) Yes, by using the $Z$ confidence interval formula with $\hat{p} = 0.12$.
   c) Yes, by using the $t$ confidence interval formula with $\hat{p} = 0.1115$.
   d) Yes, by using the $Z$ confidence interval formula with $\hat{p} = 0.154$.
   e) Yes, by using the $t$ confidence interval formula with $\hat{p} = 0.111$.

9. What is the value of $z$ needed to make a 91% confidence interval?
   a) 1.70
   b) 1.34
   c) 1.77
   d) 1.66
   e) 1.59
Questions 10 – 19 Do the majority of American adults believe it is ok to live together with a partner without getting married? In 2012 the General Social Survey asked how they felt about the statement: “It is alright for a couple to live together without intending to get married.” Out of 1294 people 711 said they agreed or strongly agreed with that statement.

10. Construct a 95% confidence interval for the proportion of Americans who would say it is alright for a couple to live together without intending to get married.
   (a) (0.522, 0.577)
   (b) (0.543, 0.556)
   (c) (0.549, 0.550)
   (d) (0.531, 0.569)
   (e) (0.516, 0.587)

11. Based on this confidence interval we can say that the population proportion of Americans who would say it is alright for a couple to live together without intending to get married:
   a) is not 50%  
   b) is less than 50%
   c) is more than 50%
   d) is exactly 50%
   e) could be 50%

12. To determine if the majority of Americans (that is, more than half) would say it is alright for a couple to live together without intending to get married we should write the hypotheses as:
   a) Ho: \( \hat{p} = .5495 \)  Ha: \( \hat{p} > .5495 \)
   b) Ho: \( p = .5 \)  Ha: \( p > .5 \)
   c) Ho: \( \hat{p} = .5 \)  Ha: \( \hat{p} > .5 \)

13. Match the following symbols with their value for this test:
   C. p  a) 1294
   14. \( \hat{p} \)  b) 0.5495
   15. \( p_0 \)  c) unknown
   16. x  d) 711
   17. n  e) 0.5

18. The standard error of the test statistic to conduct that test is:
   a) different from the standard error for making a confidence interval for \( \mu \)
   b) different from the standard error for making a confidence interval for \( p \)
   c) the same as the standard error for making a confidence interval for \( \mu \)
   d) the same as the standard error for making a confidence interval for \( p \)
   e) none of the above

19. The attitudes towards living together have changed quite a bit in the past decades. The same question was asked in 1994, and 587 out of 1422 respondents saying they agreed or strongly agreed that it is alright for a couple to live together without intending to get married was. The test statistic to determine if more than 40% of Americans felt that way in 1994 was \( z = 0.99 \). The p-value for this test is:
   a) 0.3222
   b) 0.2330
   c) 0.1611
   d) 0.8389
   e) 0.7670

20. Bootstrap Confidence Intervals differ from other confidence interval methods we’ve learned in class mainly in that:
   a) It does not require any assumptions of randomness.
   b) It does not require any particular shape for the sampling distribution.
   c) It can be done easily by hand instead of requiring a computer.
   d) It makes inferences about statistics instead of parameters.
   e) All of the above.
Questions 21 – 26 A recent survey of 30 UF students asked them how many servings of fruits and vegetables they consumed on a typical day. The mean was 2.63 and the standard deviation was 2.17.

21. The two numbers that appear in bold are:
   a) A parameter and a statistic respectively.
   b) A statistic and a parameter respectively.
   c) Both parameters.
   d) Both statistics.
   e) None of the above.

22. Construct a 95% confidence interval for μ.
   a) (1.98, 3.28)
   b) (1.80, 7.06)
   c) (1.62, 6.88)
   d) (1.61, 3.65)
   e) (1.82, 3.44)

23. In this problem μ represents the average number of servings of fruits and vegetables consumed on a typical day by:
   a) these 30 students, which is 2.63.
   b) all UF students, which is unknown.
   c) all UF students, which is 2.63.
   d) all students in the sample, which is 2.63.
   e) all students in the sample, which is unknown.

24. Are there any problems with the assumption of randomness?
   a) There is a problem - it would be absolutely impossible to take a true random sample of UF students.
   b) The sample size of 30 is large enough that we don’t need to worry about that assumption.
   c) We need more information about how exactly the data was collected to determine this.
   d) No problem - it is a random sample because we are only extending conclusions to UF students.
   e) No problem - it is a random sample because the numbers seem representative of the population.

25. Are there any problems with the assumption of Normality for the original distribution?
   a) There is a problem - X does not appear to be Normal based on the mean and standard deviation given.
   b) The sample size of 30 is large enough that we don’t need to assume X has a Normal distribution.
   c) We need more information about how exactly the data was collected to determine this.
   d) No problem - X is Normal because the mean and standard deviation are given.
   e) No problem - X is Normal because the CLT guarantees so for a sample size of 30 or more.

26. Can we say the Sampling Distribution of $\bar{x}$ is approximately Normal?
   a) No, $\bar{x}$ does not appear to be Normal based on the mean and standard deviation given.
   b) The sample size of 30 is large enough that we don’t need to assume $\bar{x}$ has a Normal distribution.
   c) We need more information about how exactly the data was collected to determine this.
   d) Yes, $\bar{x}$ is approximately Normal because the mean and standard deviation are given.
   e) Yes, $\bar{x}$ is approximately Normal because the CLT guarantees so for a sample size of 30 or more.

27. We take repeated random samples from a population, all of the same size n, compute the sample mean from each one and plot them. This is a description of:
   a) the Bootstrap Distribution of $\bar{x}$
   b) the Sampling Distribution of $\bar{x}$
   c) the Bootstrap Distribution of $\mu$
   d) the Sampling Distribution of $\mu$
   e) none of the above
28. If the p-value for a test is 0.04 then:
   a) we can reject the alternative hypothesis at α = .10 and the null at α = .01
   b) we can reject the null hypothesis at α = .10 and 0.05 but not at 0.01
   c) we can reject the null hypothesis at α = .01 and 0.05 but not at 0.10
   d) we can reject the alternative hypothesis at α = .10 and 0.05 but not at 0.01
   e) we can reject the alternative hypothesis at α = .01 and 0.05 but not at 0.10

29. If the p-value for a test is 0.07, we say that there is:
   a) some evidence for the null hypothesis.
   b) some evidence for the alternative hypothesis.
   c) pretty strong evidence for the alternative hypothesis.
   d) pretty strong evidence for the null hypothesis.
   e) not enough evidence for the null hypothesis.

Questions 30 – 33

In the past few weeks, as the results of the presidential primaries are released with Donald Trump emerging as the frontrunner for the Republican party, searches for “how can I move to Canada” have spiked higher than at any time in Google’s history. This type of reaction is common on election years, but most people that look up this information or say they would consider leaving the US never follow through with it. Suppose 25% of Americans are pondering a move to Canada if Trump becomes president. Now consider taking a random sample of 500 Americans to ask them that question and computing the proportion in the sample that says yes.

30. Are the conditions necessary for the sampling distribution of \( \hat{p} \) to be Normal satisfied?
   a) Yes, since there are no outliers in the data.
   b) Yes, since we expect 125 people to say yes and 375 to say no.
   c) Yes, since there are over 30 people in the sample.
   d) Yes, since we can go three standard deviations left and right of the mean.
   e) All of the above.

31. What are the mean and standard error of the sampling distribution of \( \hat{p} \)?
   a) Impossible to tell.
   b) 125 and 9.68
   c) 500 and 0.25
   d) 0.25 and 0.019
   e) 375 and 12.5

32. What is the probability that less than 20% in the sample say they are pondering a move to Canada.
   a) 0.7370
   b) 0.9957
   c) 0.2630
   d) 0.0043
   e) 0.0097

33. If we wanted to estimate the proportion of UF students who are pondering a move to Canada to within 0.01 of the true proportion, with 95% confidence, how many students would we need to sample?
   a) 73
   b) 37
   c) 7203
   d) 3675
   e) 368
Questions 1 -- 4 In the past few weeks, as the results of the presidential primaries are released with Donald Trump emerging as the frontrunner for the Republican party, searches for “how can I move to Canada” have spiked higher than at any time in Google’s history. This type of reaction is common on election years, but most people that look up this information or say they would consider leaving the US never follow through with it. Suppose 25% of Americans are pondering a move to Canada if Trump becomes president. Now consider taking a random sample of 500 Americans to ask them that question and computing the proportion in the sample that says yes.

1. Are the conditions necessary for the sampling distribution of \( \hat{p} \) to be Normal satisfied?
   a) Yes, since there are over 30 people in the sample.
   b) Yes, since we can go three standard deviations left and right of the mean.
   c) Yes, since there are no outliers in the data.
   d) Yes, since we expect 125 people to say yes and 375 to say no.
   e) All of the above.

2. What are the mean and standard error of the sampling distribution of \( \hat{p} \)?
   a) 375 and 12.5
   b) 0.25 and 0.019
   c) 125 and 9.68
   d) 500 and 0.25
   e) Impossible to tell.

3. What is the probability that less than 20% in the sample say they are pondering a move to Canada.
   a) 0.0097
   b) 0.9957
   c) 0.2630
   d) 0.0043
   e) 0.7370

4. If we wanted to estimate the proportion of UF students who are pondering a move to Canada to within 0.01 of the true proportion, with 95% confidence, how many students would we need to sample?
   a) 368
   b) 3675
   c) 73
   d) 37
   e) 7203

5. A study of 50 college students who own motorcycles or scooters found that only 6 of them always wear a helmet when riding it. Can we construct a confidence interval for the true proportion of college students that do?
   a) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.154 \).
   b) Yes, by using the t confidence interval formula with \( \hat{p} = 0.111 \).
   c) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.148 \).
   d) Yes, by using the Z confidence interval formula with \( \hat{p} = 0.12 \).
   e) Yes, by using the t confidence interval formula with \( \hat{p} = 0.1115 \).
Questions 6 – 11 A recent survey of 30 UF students asked them how many servings of fruits and vegetables they consumed on a typical day. The mean was 2.63 and the standard deviation was 2.17.

6. The two numbers that appear in bold are:
   a) Both statistics.
   b) Both parameters.
   c) A statistic and a parameter respectively.
   d) A parameter and a statistic respectively.
   e) None of the above.

7. Construct a 95% confidence interval for \( \mu \).
   a) (1.82, 3.44)
   b) (1.80, 7.06)
   c) (1.62, 6.88)
   d) (1.61, 3.65)
   e) (1.98, 3.28)

8. In this problem \( \mu \) represents the average number of servings of fruits and vegetables consumed on a typical day by:
   a) all UF students, which is 2.63.
   b) these 30 students, which is 2.63.
   c) all students in the sample, which is 2.63.
   d) all students in the sample, which is unknown.
   e) all UF students, which is unknown.

9. Are there any problems with the assumption of randomness?
   a) There is a problem - it would be absolutely impossible to take a true random sample of UF students.
   b) We need more information about how exactly the data was collected to determine this.
   c) The sample size of 30 is large enough that we don’t need to worry about that assumption.
   d) No problem - it is a random sample because we are only extending conclusions to UF students.
   e) No problem - it is a random sample because the numbers seem representative of the population.

10. Are there any problems with the assumption of Normality for the original distribution?
    a) There is a problem- X does not appear to be Normal based on the mean and standard deviation given.
    b) We need more information about how exactly the data was collected to determine this.
    c) The sample size of 30 is large enough that we don’t need to assume X has a Normal distribution.
    d) No problem - X is Normal because the mean and standard deviation are given.
    e) No problem - X is Normal because the CLT guarantees so for a sample size of 30 or more.

11. Can we say the Sampling Distribution of \( \bar{X} \) is approximately Normal?
    a) No, \( \bar{X} \) does not appear to be Normal based on the mean and standard deviation given.
    b) We need more information about how exactly the data was collected to determine this.
    c) The sample size of 30 is large enough that we don’t need to assume \( \bar{X} \) has a Normal distribution.
    d) Yes, \( \bar{X} \) is approximately Normal because the mean and standard deviation are given.
    e) Yes, \( \bar{X} \) is approximately Normal because the CLT guarantees so for a sample size of 30 or more.

12. Which of the following is NOT a topic or procedure we have learned in this class?
    a) Sampling Distribution of a Sample Proportion.
    b) Determining Sample Size for a Confidence Interval for a Population Mean.
    c) Bootstrap Confidence Interval for a Population Median.
    d) Significance Test for a Sample Proportion.
    e) Confidence Interval for a Population Mean.
13. If the p-value for a test is 0.07, we say that there is:  
a) some evidence for the null hypothesis.  
b) pretty strong evidence for the null hypothesis.  
c) not enough evidence for the null hypothesis.  
d) some evidence for the alternative hypothesis.  
e) pretty strong evidence for the alternative hypothesis.

14. If the p-value for a test is 0.04 then:  
a) we can reject the null hypothesis at \( \alpha = 0.10 \) and 0.05 but not at 0.01  
b) we can reject the null hypothesis at \( \alpha = 0.01 \) and 0.05 but not at 0.10  
c) we can reject the alternative hypothesis at \( \alpha = 0.10 \) and 0.05 but not at 0.01  
d) we can reject the alternative hypothesis at \( \alpha = 0.01 \) and 0.05 but not at 0.10  
e) we can reject the alternative hypothesis at \( \alpha = 0.10 \) and the null at \( \alpha = 0.01 \)

Questions 15 – 20 The Democratic frontrunner for the presidential nomination is Hillary Clinton. She is seen by many as an “establishment” candidate and a Washington insider. A poll conducted by ABC News/Washington Post on March 3-6, 2016 surveyed 1,000 adults nationwide and asked them the question: "Overall, do you have a favorable or unfavorable impression of Hillary Clinton?" 52% of respondents said they had an unfavorable impression of her. We constructed a 95% confidence interval for \( p \), the proportion of American adults who feel this way: (0.49, 0.55). Assuming all necessary conditions are satisfied, determine if the following interpretations are True or False.

15. We are 95% confident that the proportion of Americans in the population that has an unfavorable impression of Hillary Clinton is between 49% and 55%.  
16. The probability that \( p \) is between 0.49 and 0.55 is .95.  
17. We are 95% confident that the proportion of Americans in the sample that has an unfavorable impression of Hillary Clinton is between 49% and 55%.  
18. There is a 95% probability that the proportion of Americans in the sample with an unfavorable impression of Hillary Clinton is between 49% and 55%.  
19. 95% of all Americans believe that the percentage of people with an unfavorable impression of Hillary Clinton is between 49% and 55%.  
20. The probability that \( p \) is included in a 95% confidence interval is .95.

21. What is the value of \( z \) needed to make a 91% confidence interval?  
a) 1.66  
b) 1.59  
c) 1.70  
d) 1.34  
e) 1.77

22. Bootstrap confidence intervals differ from other confidence interval methods we’ve learned in class mainly in that:  
a) It does not require any particular shape for the sampling distribution.  
b) It can be done easily by hand instead of requiring a computer.  
c) It does not require any assumptions of randomness.  
d) It makes inferences about statistics instead of parameters.  
e) All of the above.
23. We take repeated random samples from a population, all of the same size \( n \), compute the sample mean from each one and plot them. This is a description of:
   a) the Bootstrap Distribution of \( \mu \)
   b) the Sampling Distribution of \( \mu \)
   c) the Bootstrap Distribution of \( \bar{x} \)
   d) the Sampling Distribution of \( \bar{x} \)
   e) none of the above

Questions 24 – 33 Do the majority of American adults believe it is ok to live together with a partner without getting married? In 2012 the General Social Survey asked how they felt about the statement: “It is alright for a couple to live together without intending to get married.” Out of 1294 people 711 said they agreed or strongly agreed with that statement.

24. Construct a 95% confidence interval for the proportion of Americans who would say it is alright for a couple to live together without intending to get married.
   a) \((0.516, 0.587)\)
   b) \((0.543, 0.556)\)
   c) \((0.549, 0.550)\)
   d) \((0.522, 0.577)\)
   e) \((0.531, 0.569)\)

25. Based on this confidence interval we can say that the population proportion of Americans who would say it is alright for a couple to live together without intending to get married:
   a) is exactly 50%  
   b) could be 50%
   c) is less than 50%  
   d) is more than 50%  
   e) is not 50%

26. To determine if the majority of Americans (that is, more than half) would say it is alright for a couple to live together without intending to get married we should write the hypotheses as:
   a) \( H_0: \hat{p} = .5 \quad H_a: \hat{p} > .5 \)
   b) \( H_0: \hat{p} = .5495 \quad H_a: \hat{p} > .5495 \)
   c) \( H_0: p = .5 \quad H_a: p > .5 \)
   d) \( H_0: p = .5 \quad H_a: \hat{p} = .5495 \)
   e) \( H_0: \hat{p} = .5495 \quad H_a: p = .5 \)

Match the following symbols with their value for this test:

27. \( \hat{x} \)
   a) 0.5495
28. \( n \)
   b) 0.5
29. \( p_0 \)
   c) unknown
30. \( p \)
   d) 1294
31. \( \hat{p} \)
   e) 711

32. The standard error of the test statistic to conduct that test is:
   a) different from the standard error for making a confidence interval for \( p \)
   b) the same as the standard error for making a confidence interval for \( \mu \)
   c) the same as the standard error for making a confidence interval for \( p \)
   d) different from the standard error for making a confidence interval for \( \mu \)
   e) none of the above

33. The attitudes towards living together have changed quite a bit in the past decades. The same question was asked in 1994, and 587 out of 1422 respondent saying they agreed or strongly agreed that it is alright for a couple to live together without intending to get married was. The test statistic to determine if more than 40% of Americans felt that way in 1994 was \( z = 0.99 \). The p-value for this test is:
   a) 0.2330
   b) 0.7670
   c) 0.1611
   d) 0.8389
   e) 0.3222