1. Consider the following excel output:

<table>
<thead>
<tr>
<th>Widgets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Sample Variance</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Range</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Sum</td>
</tr>
<tr>
<td>Count</td>
</tr>
<tr>
<td>Confidence Level(90.0%)</td>
</tr>
</tbody>
</table>

Based on the data provided in the above table, suppose you want to test the claim that the true population mean was greater than 50. Which of the following statements is correct?

\[ t_{0.1,12} = 1.356 \quad t_{0.05, 12} = 1.782 \quad t_{0.025, 12} = 2.179 \]

a. At the 1% significance level, you can conclude that the population mean is greater than 50.

b. At the 5% significance level, you can conclude that the population mean is greater than 50.

c. At the 10% significance level, you can conclude that the population mean is greater than 50.

d. At the 10% significance level, you do not have enough evidence to conclude that the population mean is greater than 50.

e. At the 20% significance level, you do not have enough evidence to conclude that the population mean is greater than 50.
2. Which of the following is NOT true about the correlation coefficient?
   a. It is a scaled measure of the co-movement of two variables.
   b. It indicates the strength of a relationship between variables.
   c. A negative value indicates an inverse relationship between two variables.
   d. A value of 1 indicates a perfect linear association between two variables.
   e. If the covariance is zero, the correlation coefficient is not necessarily zero.

3. Calculate the SAMPLE VARIANCE of the following array: \{4, 10, 77, 33\}
   a. 822.50
   b. 1096.67
   c. 33.12
   d. 31
   e. None of the above

4. All the following statements are true except:
   a. The sampling distribution of the sample mean is approximately normal for a sufficiently large sample.
   b. The smaller the sample size, the closer the sampling distribution of the sample mean will look to the population distribution.
   c. The mean of the sampling distribution is equal to the population mean.
   d. The variance of the sampling distribution is always equal to the population variance.
   e. The central limit theorem allows us to go from the sampling distribution to the population distribution without worrying about what the population distribution looks like.

5. Suppose we want to test whether people in Illinois are happier now that they have a Democratic governor. A survey asks 500 people in Illinois: are you happier now than you were four years ago? 300 of the respondents say that they are indeed happier. It is known that, under the previous governor, 50% of Illinois residents were happy. Which of the following statements is correct? (Choose the best answer)
   a. We are testing a claim about a population proportion.
   b. The point estimate is 0.5.
   c. The test statistic will have a standard normal distribution.
   d. Both answers a) and c) are correct
   e. Answers a), b), and c) are correct.

6. Suppose that, in measuring the variation in the production process of Acme Widgets, you have estimated a 95% confidence interval for the population variance based on a sample of 30 observations. However, in her comments on a draft of your report, your boss says that she thinks your confidence interval is too wide. What actions could you take that would be certain to decrease the size of the interval?
   a. use a t distribution instead of a z distribution
   b. decrease the sample size to 25 and lower the confidence level to 90%
   c. increase the sample size to 35 and raise the confidence level to 99%
   d. decrease the sample size to 25 and raise the confidence level to 99%
   e. increase the sample size to 35 and lower the confidence level to 90%
7. If a mound-shaped distribution is symmetric, the mean coincides with:
   a. The standard deviation
   b. The variance
   c. The median
   d. The covariance
   e. The correlation coefficient

8. Find the mode of the following array: \{40, 42, 50, 38, 65, 50, 43\}
   a. 67
   b. 40
   c. 50
   d. 43
   e. 46.8

9. You want to test whether seniors at the UIUC have a higher GPA than juniors. So, you gather data and want to test the difference in means. Data is displayed in the table below:

   F-Test Two-Sample for Variances

<table>
<thead>
<tr>
<th></th>
<th>Juniors</th>
<th>Seniors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2.464858055</td>
<td>3.018031551</td>
</tr>
<tr>
<td>Variance</td>
<td>0.861577542</td>
<td>0.36857119</td>
</tr>
<tr>
<td>Observations</td>
<td>39</td>
<td>75</td>
</tr>
<tr>
<td>Df</td>
<td>38</td>
<td>74</td>
</tr>
<tr>
<td>F</td>
<td>2.337614998</td>
<td></td>
</tr>
<tr>
<td>P(F&lt;=f) one-tail</td>
<td>0.000900569</td>
<td></td>
</tr>
<tr>
<td>F Critical one-tail</td>
<td>1.566149876</td>
<td></td>
</tr>
</tbody>
</table>

   What would you do at 5% significance?
   a. proceed with the t-test for difference in means assuming unequal variances
   b. proceed with the t-test for difference in means assuming equal variances
   c. perform an F-test and conclude that Juniors have a higher GPA than Seniors
   d. proceed with the paired sample t-test for difference in means
   e. perform an F-test and conclude that Seniors and Juniors have the same variance in GPA

10. Based on the following data on stock prices and dividends. Find the POPULATION COVARIANCE of these two variables:

<table>
<thead>
<tr>
<th>Stock price</th>
<th>5</th>
<th>12</th>
<th>8</th>
<th>6</th>
<th>15</th>
<th>10</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividend</td>
<td>.3</td>
<td>.9</td>
<td>.4</td>
<td>.4</td>
<td>1.0</td>
<td>.6</td>
<td>.5</td>
</tr>
</tbody>
</table>

   a. 10.8571
   b. .0612
   c. .7857
   d. .9637
   e. 1
11. Suppose we have estimated a confidence interval for the difference of two means, assuming equal variances in the populations from which the two samples were drawn. Let the population means be denoted by $\mu_1$ and $\mu_2$, the sample sizes by $n_1$ and $n_2$, the sample means by $\bar{x}_1$ and $\bar{x}_2$, and the sample variances by $s_1^2$ and $s_2^2$. What is the midpoint of the estimated interval?
   a. $n_1 + n_2 - 2$
   b. $\mu_1 - \mu_2$
   c. $(n_1-1)*s_1^2 + (n_2-2)*s_2^2/(n_1+n_2-2)$
   d. $\bar{x}_1 - \bar{x}_2$
   e. $\bar{x}_1/s_1 + \bar{x}_2/s_2$

12. A symmetric mound-shaped distribution of weight of Econ 173 students is centered at 120 pounds with a standard deviation of 15 pounds. Using the empirical rule, determine what proportion of the students weigh between 90 pounds and 135 pounds.
   a. 81.5%
   b. 34%
   c. 95%
   d. 100%
   e. 68%

13. Pablo claims that his students perform better than Robert’s students. Specifically, Pablo claims that the average of his students’ grades is at least 5 points more than the average grade of Robert’s students (of course Robert rejects his claim!). To test this claim, we have taken a sample of 6 Pablo’s students and found that their average is 70 with a standard deviation of 3.8, and another sample of 8 students from Robert’s class has the average of 61.75 and a standard deviation of 3. If we assume that both populations have the same variance and significance level is 5%, what is the correct answer?

   
   \[ t_{0.025,10}=2.228 \quad t_{0.025,12}=2.179 \quad t_{0.05,10}=1.812 \quad t_{0.05,12}=1.782 \quad z_{0.05}=1.645 \quad z_{0.025}=1.960 \]

   a. The test statistic is 1.793 and has a standard normal distribution. We would believe Pablo’s claim.
   b. The test statistic is 1.793 and has a t distribution with 10 degrees of freedom. We would believe Pablo’s claim.
   c. The test statistic is 1.793 and has a t distribution with 12 degrees of freedom. We would believe Pablo’s claim.
   d. The test statistic is 1.729 and has a t distribution with 10 degrees of freedom. We would not believe Pablo’s claim.
   e. The test statistic is 1.729 and has a t distribution with 12 degrees of freedom. We would not believe Pablo’s claim.
14. Compute the SAMPLE CORRELATION COEFFICIENT to measure how the number of commercials and sales level are related to one another based on the data provided.

\[
\begin{array}{|c|c|c|}
\hline
\text{cmls} & \text{sales} \\
\hline
1 & 35 \\
4 & 28 \\
5 & 66 \\
5 & 44 \\
2 & 12 \\
6 & 55 \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|}
\hline
\text{Covariance table} & \\
\hline
\text{cmls} & 3.139 \\
\text{sales} & 21.833 \quad 311.667 \\
\hline
\end{array}
\]

a. 1  
b. 21.833  
c. 0.6980  
d. 0.0223  
e. 0.0701

15. We did a survey of 7 students who had passed Econ 173 and then we have asked for their grades in Econ 172 and Econ 173. This is the data:

*Note: Assume that Econ 173 is population 1 and Econ 172 is population 2*

<table>
<thead>
<tr>
<th>Econ 173</th>
<th>Econ 172</th>
</tr>
</thead>
<tbody>
<tr>
<td>86</td>
<td>78</td>
</tr>
<tr>
<td>92</td>
<td>90</td>
</tr>
<tr>
<td>72</td>
<td>66</td>
</tr>
<tr>
<td>68</td>
<td>70</td>
</tr>
<tr>
<td>86</td>
<td>85</td>
</tr>
<tr>
<td>65</td>
<td>53</td>
</tr>
<tr>
<td>80</td>
<td>83</td>
</tr>
</tbody>
</table>

We want to test whether there is an improvement in the students’ grades from Econ 172 to Econ 173. At the 5% significance level, which choice is the correct one?

- \( t_{0.1,6}=1.440 \)  
- \( t_{0.05,6}=1.943 \)  
- \( t_{0.025,6}=2.447 \)

a. We have a t-test: two samples assuming equal variances, the test statistic is 1.657 and we would reject the null hypothesis.  
b. We have a t-test: matched pairs; the test statistic is 1.657 and we would reject the null hypothesis.  
c. We have a t-test: two samples assuming equal variances, the test statistic is 0.552 and we would reject the null hypothesis.  
d. We have a t-test: matched pairs; the test statistic is 0.552 and we would fail to reject the null hypothesis.  
e. We have a t-test: matched pairs; the test statistic is 1.657 and we would fail to reject the null hypothesis.
16. Suppose you want to test whether a famous soccer player Ronaldo has been more effective from the penalty spot in the season 2002 or in the season 2003. So you go to Real Madrid’s website and gather data on the number of his attempts to score from the penalty spot and the number of actual goals he scored from the penalty spot. Given this information, which of the following tests would be the most appropriate?
   a. t-test for difference in means assuming unequal variances
   b. Z-test for difference in means
   c. Z-test for difference in proportions
   d. F-test for difference in proportions
   e. paired-sample-t-test for difference in means

17. Suppose that you have two independent samples and you want to test whether sample 1 has a higher variance than sample 2. You know that the first sample has 25 observations with a standard deviation of 1.72 and that the second sample has 20 observations with a standard deviation of 1.19.

\[
\begin{align*}
F_{0.025, 25, 20} &= 2.396 & F_{0.05, 25, 20} &= 2.074 & F_{0.025, 24, 19} &= 2.452 \\
F_{0.05, 24, 19} &= 2.114 & F_{0.025, 19, 24} &= 2.345 & F_{0.05, 19, 24} &= 2.040
\end{align*}
\]

What would your conclusion be at 5% significance?
   a. reject the null hypothesis and conclude that there is insufficient evidence to infer that sample 1 has a higher variance than sample 2
   b. reject the null hypothesis and conclude that sample 1 has a higher variance than sample 2
   c. fail to reject the null hypothesis and conclude that there is insufficient evidence to infer that sample 1 has a higher variance than sample 2
   d. fail to reject the null hypothesis and conclude that sample 1 has a higher variance than sample 2
   e. there is not enough information to make any conclusions

18. To go from the sampling distribution of the sample mean to the standardized distribution and from the population distribution to the standardized distribution we use, respectively (assume in both cases that the population mean and variance are known)

   a. \( z = \frac{x - \mu}{\sigma} \) and \( \bar{z} = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} \)
   b. \( t = \frac{x - \mu}{\sigma} \) and \( \bar{z} = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} \)
   c. \( z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} \) and \( z = \frac{x - \mu}{\sigma} \)
   d. \( t = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} \) and \( z = \frac{x - \mu}{\sigma} \)
   e. \( t = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} \) and \( \chi^2 = (n-1)s^2/\sigma^2 \)
19. Which of the following is true about RANGE?
   a. It’s a measure of central tendency.
   b. It’s a measure of association.
   c. It’s the most commonly used measure of dispersion.
   d. It’s the difference between the largest and the smallest observation in a sample.
   e. None of the above.

**Use the following information to answer the next two questions (#20-21)**

Pablo claims that the variability of the midterm grades was higher last semester than it has historically been. In order to test if this claim is true, he collected a sample of 12 of the last semester’s midterm exam scores. The sample of 12 exams for the midterm was the following:

57, 56, 54, 55, 54, 56, 57, 59, 54, 52, 52, 53

It is also known that the historical variance of the midterm scores is 4.727.

20. Which is the value of the test statistic for testing Pablo’s claim?
   a. 20.52
   b. 80.81
   c. 10.77
   d. 35.15
   e. 0.254

21. What is the upper level of a 95% confidence interval for the variability of grades?

\[
\chi^2_{.975,11} = 3.82 \quad \chi^2_{.025,11} = 21.92 \quad \chi^2_{.975,12} = 4.40 \quad \chi^2_{.025,12} = 23.34
\]

   a. 13.33
   b. 2.32
   c. 2.18
   d. 11.56
   e. 8.77

22. In which of the followings cases is it NOT appropriate to calculate a test for variance:
   a. Assess the “risk” of a particular investment
   b. Look at the consistency of a production process for quality control purposes
   c. Make an estimate of the representative household income in a city
   d. Study the variation in temperatures in a particular region
   e. Analyze the fluctuations in profits for a particular business
23. Which test you would use if you wanted to test some assumption about the population mean using the information given in the following table:

<table>
<thead>
<tr>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Sample Variance</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Count</td>
</tr>
</tbody>
</table>

a. $z$ test.
b. $t$ test
c. $\chi^2$ test
d. $t$ test with equal variances
e. $F$ test

24. What is NOT true about the $\chi^2$ distribution?
   a. It does not contain negative values
   b. It is skewed to the right
   c. It is an asymmetric distribution
   d. The standard deviation is always equal to one
   e. Its shape depends on the degrees of freedom

25. Pablo tells you that a higher proportion of college students in Europe play sports as compared to their peers at US colleges. You are skeptical and decide to investigate further. You gather data on the European students (sample 1) and out of 450 students, 135 play sports, while the data on the US students (sample 2) reveals that out of 1000 students, 350 play sports. Can you conclude, at 5% significance, that more European students play sports, as compared to the US students? ($z_{0.1}=1.28$, $z_{0.05}=1.645$, $z_{0.025}=1.96$)
   a. reject the null hypothesis and conclude that more European students play sports, as compared to the US students
   b. reject the null hypothesis and conclude that there is not enough information to infer that more European students play sports, as compared to the US students
   c. fail to reject the null hypothesis and conclude that more European students play sports, as compared to the US students
   d. fail to reject the null hypothesis and conclude that there is not enough information to infer that more European students play sports, as compared to the US students
   e. since I am not given sample variances, I cannot make any conclusions about this test
Use the following information to answer the next four questions (#26-29)

One of your TAs (Pablo) got frustrated one day while paying his bills at the Cashier’s Office. More specifically, he suspected that one of the tellers was sometimes taking way too long to complete a transaction while sometimes the same teller would complete the transaction much faster. So, he decided to record waiting times for 100 students waiting to pay at the above mentioned teller (teller 1) and waiting times for 100 students waiting to pay at another teller (teller 2). The average waiting time at the first teller was 7.8 minutes with a standard deviation of 3.3 minutes, while the average waiting time at the second teller was 7.9 minutes with a standard deviation of 1.8 minutes. Can we conclude that we are more uncertain about how long we will wait in line if we go to the first teller than we would be if we went to the second teller?

26. Which test would you perform in this case?
   a. t - test for difference in means assuming unequal variances
   b. t - test for difference in means assuming equal variances
   c. paired sample t-test for difference in means
   d. F - test for difference in variances
   e. $\chi^2$ - test for variance

27. What would your null and alternative hypotheses look like?
   a. $H_0: \mu_1 - \mu_2 \geq 0; \ H_1: \mu_1 - \mu_2 < 0$
   b. $H_0: \mu_1 - \mu_2 \leq 0; \ H_1: \mu_1 - \mu_2 > 0$
   c. $H_0: \sigma_1^2 / \sigma_2^2 \leq 1; \ H_1: \sigma_1^2 / \sigma_2^2 > 1$
   d. $H_0: \sigma_1^2 / \sigma_2^2 \geq 1; \ H_1: \sigma_1^2 / \sigma_2^2 < 1$
   e. $H_0: \sigma_1^2 - \sigma_2^2 \leq 1; \ H_1: \sigma_1^2 - \sigma_2^2 > 1$

28. What would the value of the test statistic be?
   a. 3.361
   b. -0.1
   c. 7.65
   d. 332.75
   e. -0.266

29. At 5% significance, what would your conclusion be about the above claim when you know that the relevant critical value is 1.394?
   a. reject the null hypothesis and conclude that you are more uncertain about the waiting time if you go to teller 1 than if you go to teller 2
   b. fail to reject the null hypothesis and conclude that there is insufficient evidence to infer that you are more uncertain about the waiting time if you go to teller 1 than if you go to teller 2
   c. fail to reject the null hypothesis and conclude that you are more uncertain about the waiting time if you go to teller 1 than if you go to teller 2
   d. reject the null hypothesis and conclude that there is insufficient evidence to infer that you are more uncertain about the waiting time if you go to teller 1 than if you go to teller 2
   e. there is not enough information to make any conclusions
Use the following information to answer the next two questions (# 30-31)

A pharmaceutical company “Smoquit” producing drugs that will help you quit smoking has developed a new brand of a drug and wants to market it aggressively. They would like to say that their drug has at least 10% higher successful rate of quitting smoking than their leading competitor. So, they test the drug and out of 1200 smokers using their drug (sample 1), 525 quit smoking. Out of 1000 smokers using the competitor’s drug (sample 2), 300 quit smoking. Can “Smoquit” claim that their product has at least 10% higher successful rate of quitting at 10% significance?

\[ z_{0.1} = 1.28 \quad z_{0.05} = 1.645 \quad z_{0.025} = 1.96 \]

30. What are the relevant point estimate and the test statistic?
   a. 225 and 1.645
   b. 0.375 and 1.645
   c. 0.1375 and 1.645
   d. 0.1375 and 1.841
   e. 0.1375 and 9.325

31. What is your conclusion?
   a. fail to reject the null hypothesis and conclude that “Smoquit” can claim that their drug is 10% more effective than their competitor’s drug
   b. fail to reject the null hypothesis and conclude that “Smoquit” cannot claim that their drug is 10% more effective than their competitor’s drug
   c. reject the null hypothesis and conclude that “Smoquit” can claim that their drug is 10% more effective than their competitor’s drug
   d. reject the null hypothesis and conclude that “Smoquit” cannot claim that their drug is 10% more effective than their competitor’s drug
   e. we are missing the p-value so there is not enough information provided to even perform the test

32. Suppose that we have made an estimate for the variance of a population using a \( \chi^2 \) distribution, and our 95% confidence interval was: (19.6, 25.2). If later research demonstrates that the population variance was almost certainly greater than 30, which statement is most correct about this situation?
   a. The procedure we used to get the confidence interval must have been incorrect.
   b. Our sample size was too small.
   c. This indicates that we should have used a \( z \) distribution.
   d. This outcome does not invalidate our procedure, since we allow some probability that our confidence interval will not capture the true population variance.
   e. This situation cannot occur.
33. Suppose that you want to estimate what share of the students who took Econ 173 last semester thought that their TA’s were especially patient and helpful. Moreover, you want your estimate to be within ±0.1 of its true population value with 95% confidence. The smallest sample size required to accomplish this is:

\[ z_{.1} = 1.28 \quad z_{.05} = 1.645 \quad z_{.025} = 1.96 \]

a. 48  

b. 95 

c. 96 

d. 97 

e. 200

34. Ignoring the results of the previous question, your friend decides to undertake the same survey, and interviews 150 students who took Econ 173 last semester. It turns out that 100 of the students in her sample thought that their TAs were patient and helpful. A 90% confidence interval for the true share of the students who thought that their TAs were helpful would be closest to:

\[ z_{.1} = 1.28 \quad z_{.05} = 1.645 \quad z_{.025} = 1.96 \]

a. [0.603, 0.730] 

b. [0.375, 0.426] 

c. [0.749, 0.851] 

d. [0.187, 0.213] 

e. [0.350, 0.551]
Use the following information to answer the next three questions (# 35-37)
Recall the question from one of your homeworks where you had the health costs for men and women. We assumed that both populations have the same variance and used Excel to find the following table for this data, but some parts of the table have been erased by mistake! The significance level is 5%.

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1244.792174</td>
<td>1169.065932</td>
</tr>
<tr>
<td>Variance</td>
<td>668222.737</td>
<td>707605.9119</td>
</tr>
<tr>
<td>Observations</td>
<td>69</td>
<td>59</td>
</tr>
<tr>
<td>Pooled Variance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothesized Mean Difference</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Df</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>t Stat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.303557618</td>
<td></td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.657035682</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>0.607115236</td>
<td></td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>1.978969522</td>
<td></td>
</tr>
</tbody>
</table>

35. What is the value of pooled variance?
   a. 828.3788
   b. 686351.5
   c. 697270.8
   d. 686375.9
   e. None of the above.

36. What is the value of the test statistic?
   a. -0.415
   b. 0.540
   c. 0.515
   d. -0.440
   e. None of the above.

37. Construct a 95% confidence interval for the value of the difference in means of the populations
   a. [-214.988, 366.441]
   b. [65.627, 85.826]
   c. [-217.292, 368.744]
   d. [-211.359,364.667]
   e. None of the above.
Use the following information to answer the next three questions (#38-40)

In an agricultural experiment, two expensive high-yield varieties of corn are to be tested and yield improvements are to be measured. The experiment is arranged so that each variety is planted in ten pairs of similar plots. We want to find out whether the improvement in variety A exceeds the improvement in variety B by more than 2. We used Excel to create this table:

<table>
<thead>
<tr>
<th></th>
<th>Variety A</th>
<th>Variety B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>11.4</td>
<td>10.79</td>
</tr>
<tr>
<td>Variance</td>
<td>6.933333333</td>
<td>6.445444444</td>
</tr>
<tr>
<td>Observations</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.698751452</td>
<td></td>
</tr>
<tr>
<td>Hypothesized Mean Difference</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Df</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>t Stat</td>
<td>-2.18780864</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.028225765</td>
<td></td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.833113856</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>0.05645153</td>
<td></td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>2.262158887</td>
<td></td>
</tr>
</tbody>
</table>

*Note: to get the above table, a test was performed using 5% significance*

38. What is the correct choice?
   a. We have a t-test: matched pairs; the alternative hypothesis is \( \mu_D > 0 \) and we would reject the null hypothesis.
   b. We have a t-test: matched pairs; the alternative hypothesis is \( \mu_D > 2 \) and we would reject the null hypothesis.
   c. We have a t-test: matched pairs; the alternative hypothesis is \( \mu_D < 2 \) and we would reject the null hypothesis.
   d. We have a t-test: matched pairs; the alternative hypothesis is \( \mu_D < 0 \) and we would reject the null hypothesis.
   e. We have a t-test: matched pairs; the alternative hypothesis is \( \mu_D > 2 \) and we would fail to reject the null hypothesis.

39. What is the 95% confidence interval for the true mean of population differences above given that the standard deviation of the differences \( s_D = 2.009 \)?
   a. \([-0.827, 2.047]\)
   b. \([-0.555, 1.775]\)
   c. \([-2.555, -0.225]\)
   d. \([-2.827, 0.047]\)
   e. None of the above
40. Which shaded area (designated by the arrow) is the appropriate p-value for the test (correctly) identified above?

*Note: all the distributions are centered on zero.*
ANSWER KEY

1. C
2. E
3. B
4. D
5. D
6. E
7. C
8. C
9. A
10. C
11. D
12. A
13. C
14. C
15. D
16. C
17. C
18. C
19. D
20. C
21. A
22. C
23. B
24. D
25. D
26. D
27. C
28. A
29. A
30. D
31. C
32. D
33. D
34. A
35. B
36. C
37. A
38. E
39. A
40. D