

STATISTICS INDIVIDUAL

1. Which of the following pairs of events are disjoint?
 - a. X: the even numbers; Y: the number 8
 - b. X: the odd numbers; Y: the numbers greater than 10
 - c. X: negative numbers; Y: odd numbers
 - d. X: the numbers less than 5; Y: all negative numbers
 - e. NOTA

2. A calculator executive inspects large shipments of batteries to determine the proportion, p , in the shipment with an unacceptable charge prior to purchasing the shipment. The executive selects a random sample of 240 batteries from a shipment that contains 4000 batteries. Only 7 of the batteries sampled had unacceptable charges. Which of the following conditions about a confidence interval of a proportion has not been met?
 - a. The data is an SRS from the population of interest
 - b. The population is at least 10 times the sample size
 - c. The mean number of unacceptable batteries is normally distributed
 - d. The sample size, n , is so large that both $n\hat{p}$ and $n(1-\hat{p})$ are at least 10
 - e. There are no apparent violations

3. In a population of teachers, the number of keys on their key chain is a random variable X with $P(X=4) = .2$, $P(X=5) = .6$, and $P(X=6) = .2$. The standard deviation of this probability distribution is? Round answer to two decimals
 - a. .40
 - b. .63
 - c. .16
 - d. Not possible to calculate without more information
 - e. NOTA

4. A company developed a new additive for cola's that would reduce loss of sweetness due to storage. When the company tested it against an additive from another company, a sample size of 100 cola's showed no statistical difference between the two additives. However, when the sample size was increased to 1000 cola's, the results showed a clear statistical difference between the two companies additives. The first study illustrated the principal of
 - a. Strong replication
 - b. High power
 - c. Type I error
 - d. Low power
 - e. NOTA

5. You want to estimate the mean income for a population of teachers with a 90% confidence interval. Assume the population standard deviation is $\sigma = 3000$. If you want the margin of error to be 400, the smallest possible sample size needed is
 - a. 152
 - b. 153
 - c. 216
 - d. 217
 - e. NOTA

6. A group of high school runners competed in a five mile race. Runners who are in the fastest 10% will advance to the finals. The mean finishing time for the race was 43.5 minutes with a standard deviation of 16.2 minutes. Assuming the times were normally distributed, which of the following is the cutoff time?(rounded to one decimal)
 - a. 64.3 minutes
 - b. 42.2 minutes
 - c. 39.2 minutes
 - d. 22.8 minutes
 - e. NOTA

STATISTICS INDIVIDUAL

7. If you recorded the income of a random sample of 20 teachers in your county and a 90% confidence interval for the mean income for the teachers in your county is (\$41,000, \$43,000).

Which of the following statements gives a valid interpretation of this interval?

- If the procedure were repeated many times, 90% of the sample means would be between \$41,000 and \$ 43,000.
- The probability that the population mean income is between \$41,000 and \$43,000 is .90.
- Ninety percent of the sample of teachers have a income between \$41,000 and \$43,000
- Ninety percent of the population of teachers have a income between \$41,000 and \$43,000
- NOTA

8. C-Boy was given a two way table of observed values and was planning to carry out a chi-square test of independence. If he wanted to calculate the expected values for each cell he would

- multiply the number of rows times the number of columns
- multiply the number of rows minus one times the number of columns minus one
- multiply the row total by the column total then divide by the table total
- divide the table total by the product of the row total and column total
- NOTA

9. A researcher wants to study the effect of temperature ($0^{\circ} F$, $30^{\circ} F$ and $90^{\circ} F$) on the loss of sweetness a cola has when stored for extended periods of time. Fifty cola cans were randomly assigned to each of the temperatures for the specified storage time. The time it took for the cola to lose a certain amount of sweetness was measured for each cola can. Which of the following is the correct description of the treatment, experimental unit, and response?

- Specific temperature, loss of sweetness time, cola can
- Specific temperature, the researcher, loss of sweetness time
- Cola can, loss of sweetness time, specific temperature
- Random assignment, cola can, loss of sweetness time
- Specific temperature, cola can, loss of sweetness time

10. Which of the following is a valid probability density function on the interval $[0,2]$?

- $f(x) = x$
- $f(x) = 2x$
- $f(x) = .5x$
- $f(x) = 3 - 1.5x$
- NOTA

11. In doing a linear regression analysis, which of the following should be used when evaluating whether the model is a good model or not?

- Slope of the regression equation
- Value of the correlation coefficient
- Residual plot

- II only
- II and III
- III only
- I only
- NOTA

12. An owner of a driving range has several different bucket sizes for sale. Suppose that 70% of all golf customers get a large bucket, 50% get a medium bucket, and 40% get both. If a golf customer is randomly selected, what is the probability that he got either a large or medium bucket but not both?

- .20
- .24
- .40
- .48
- .60

STATISTICS INDIVIDUAL

13. The state of Georgia claims that 78% of students graduate their high schools and go on to college. A group of Florida statisticians doubt this claim and decide to test this hypothesis at the 5% alpha level. Which of the following is not an appropriate interpretation of the 5% level of significance?
- 5% is the criteria for judging whether the sample statistic is sufficiently extreme to cast doubt on the state of Georgia's claim.
 - 5% is the probability of rejecting the hypothesis $p_0 = .78$ when the hypothesis is true.
 - 5% is the probability of a type I error.
 - 5% is the probability of accepting the hypothesis that $p_0 = .78$ when the hypothesis is false
 - NOTA
14. A bivariate set has a value of $r^2 = .64$. Which is an appropriate conclusion?
- $r = .8$
 - 64% of the data is usable
 - There is an 64% chance that the regression line will fit the data
 - 64% of the variation in y can be explained by the model
 - NOTA
15. A two-tailed hypothesis ($\alpha = .05$) of a population mean has a P-value of .078. Which of the following conclusions is valid?
- The P-value of .078 indicates the probability that the null hypothesis is false.
 - A one-tailed test of the null hypothesis using the same sample will be significant.
 - The null hypothesis should be rejected
 - The null hypothesis should be accepted
 - NOTA
16. A NFL scout sampled 180 offensive linemen from a large population of college lineman to obtain a 95% confidence interval for the true mean weight of all college lineman. The interval was (265lbs., 284lbs.). If the scout had used a 99% confidence interval instead, the confidence interval would be
- wider but the risk of missing the true mean cannot be determined.
 - wider and would have a larger risk of missing the true mean.
 - narrower and would have a smaller risk of missing the true mean.
 - narrower and would have a larger risk of missing the true mean.
 - wider and would have a smaller risk of missing the true mean.
17. Which of the following plots is not appropriate for categorical data?
- dot plot
 - bar graph
 - pie graph
 - segmented bar graph
 - All of these are appropriate.
18. 40% of all people have type A blood. If you were to randomly select people, what is the probability that it will take at least 3 people before the first type A is found?
- .64
 - .36
 - .064
 - .096
 - NOTA

STATISTICS INDIVIDUAL

19. Lei has been doing so much math in high school that his basketball skills have declined dramatically. Lei can now only make 30% of his free throw attempts. Assuming each free throw is independent, what is the probability that Lei will not make a free throw until his fourth attempt?
- a. .0081 b. .1029 c. .7599 d. .4116 e. .3430
20. A local Lincoln rival sends out a newsletter claiming they are closing in on the Lincoln math team. The letter states that on average our scores are only 8 points below Lincoln on Mu tests. FAMAT conducts a SRS of 28 of the local rival's Mu scores and 28 of Lincoln's scores and gets an average difference of 15 points with a standard deviation of 12.1. A z-test for the difference of means using $H_0 : \mu_1 - \mu_2 = 8$ concluded that these samples did not provide sufficient evidence to doubt the local rivals claim at the 5% level. Why was the FAMAT's conclusion invalid?
- a. They should have done a stratified sample so that all levels were equally represented.
b. The sample sizes did not meet the minimum sample size requirement for a z-test.
c. The sample standard deviation was too large for the population to be approximately normal.
d. The standard deviation of the population was not known.
e. The conclusion is valid.
21. If 20 is added to the maximum value and 20 is subtracted from the minimum value of a data set, which of the following is true?
- a. The mean and the median are unchanged.
b. The mean changes but the median does not change.
c. The median changes but the mean does not change.
d. The effect on the mean and median cannot be determined without knowing the other data values.
e. NOTA
22. The number of runs scored per game in a full season of softball games for the FHSAA is strongly skewed to the right with a mean of 3.1. An SRS of sample size $n = 30$ is taken from the population and the sample mean is computed. This is repeated for a total of 330 trials. Which of the following best describes the shape and mean of the sampling distribution?
- a. Normally distributed with a mean of 3.1 runs
b. Skewed to the right with a mean of 3.1 runs
c. Binomially distributed with a mean of 3.1 runs
d. Skewed to the right with a mean of $\frac{3.1}{\sqrt{30}}$ runs
e. Normally distributed with a mean of $\frac{3.1}{\sqrt{30}}$ runs
23. Random digit tables and random number generators follow which of the following distributions?
- a. Uniform b. Binomial c. Normal d. T e. NOTA
24. In a fun activity Mr. Snow had a large jar of skittles placed on his desk, where he asked students to grab as many as they can. The number of skittles grabbed by boys has a normal distribution with a mean of 32 skittles and a variance of 36 skittles. The number of skittles grabbed by girls is also normally distributed with a mean of 23 skittles and a variance of 16 skittles. One boy and one girl each grab a handful of skittles. If the number of skittles drawn by each is independent, what is the probability that the boy grabs no more than five skittles more than the girl? Round answer to two decimals
- a. .21 b. .29 c. .34 d. .55 e. .58

STATISTICS INDIVIDUAL

25. Suppose that if rain is predicted, there is a 60% chance that it will rain. If rain is not predicted, there is a 20% chance that it will rain. Rain is predicted on 10% of the days. What percentage of the days does it rain?
- Impossible to answer without more information.
 - 18%
 - 75%
 - 24%
 - NOTA
26. A football team with 30 players of differing weights trades its smallest player to another team for a heavy lineman who is now the heaviest player on the team. Which of the following statements is False?
- The mode will stay the same
 - The standard deviation might be different
 - The median weight will stay the same
 - The mean weight of the team will increase
 - NOTA
27. Which of the following statements is the reason that the Central Limit Theorem is so important in statistics?
- It applies for any population distribution as long as the population mean is known.
 - It applies for any population distribution as long as the sample size is large
 - It applies for any sample as long as the population distribution is known
 - It applies for any sample size as long as the population is normal
 - NOTA
28. A new weight loss program called Wolfman was given to a volunteer group of 100 people who were at least 60 pounds overweight. 63 people from the group lost at least 30 pounds. What can we conclude about the effectiveness of the diet?
- Nothing, since the group knew they were using the diet.
 - Nothing, since the 100 people were not an SRS
 - Nothing, since there was no control group
 - The program was effective in 63% of the cases
 - The mean weight loss was more than 30 pounds
29. Mrs. Stone has two sections of BC Calculus. On a recent 100 point test, class A had a mean of 77 with a standard deviation of 9. Class B had a mean of 85 with a standard deviation of 6. Which of the following must be true?
- The highest score of all students combined was 100.
 - The highest score in B is greater than the highest score in A.
 - The range of A is greater than the range of B.
 - The number in each class must be known in order to compute the mean of the combined classes.
 - NOTA
30. An optometrist office has two doctors. Dr. Snow recommends Lasic surgery 40% of the time and glasses 60% of the time. Dr. Vong recommends glasses 70% of the time and Lasic surgery 30% of the time. 60% of all patients are treated by Dr. Vong. If a patient from the office is selected at random, what is the probability that Lasic was recommended?
- .18
 - .34
 - .35
 - .58
 - .70