

Multiple-Choice Questions (單選. 2 points per question)

1. In order for a researcher to be able to estimate the parameters of a population from his or her sample, the sample must be

- A) very large. B) racially diverse. C) low in variability. D) random.

2. Suppose I ask people to rate varieties of fruit on a 5-point scale ranging from 1 = "don't like" to 5 = "like very much." The level of measurement is

- A) nominal. B) ordinal. C) interval/ratio. D) continuous.

3. Assume that we had the following set of data.

Score	11	14	17	18	19	20	21	22	23	24	25
Frequency	2	1	5	8	6	12	13	10	15	9	8

These data would most likely be characterized as

- A) positively skewed. B) normal. C) negatively skewed. D) uniformly distributed.

4. Linda received a score of 70 on a chemistry exam. If she scored at the 50th percentile, her score represents the _____ of the distribution of all scores received by the students who took the same exam.

- A) mean B) median C) mode D) deviation

5. The formula for calculating the 95% probable limits on an observation is

- A) $(\mu + 1.96\sigma)$ B) $(\sigma \pm 1.96\mu)$ C) $(\mu - 1.96\sigma)$ D) $(\mu \pm 1.96\sigma)$

6. Last year there were 30 new Ph.D.s in chemistry looking for academic jobs. Of those, 10 were women and 20 were men. Nationwide last year there were 12 new hirings in chemistry departments. How many of those new hires would be expected to be women if there was no gender discrimination?

- A) 2. B) 4. C) 6. D) 8.

7. Which of the following is least likely to be a factor in selecting among statistical procedures?

- A) The type of data we have collected.
 B) Whether we are looking at relationships or differences.
 C) How many observations we have.
 D) How many groups or variables we have.

8. If you were interested in finding out how learning increases with increases in studying, what statistical question would you be asking?

- A) Is there a relationship?
 B) Is there a difference?
 C) Is there a variable?
 D) A decision tree is needed to answer this question.

9. Which of the following would come closest to recruiting a random sample of college students?

- A) Drawing 50 telephone numbers from a hat containing the phone numbers of all students.
 B) Advertising for 50 volunteers with posters in the dining halls.
 C) Calling the first 50 names from an alphabetical list of all students.
 D) Asking 50 people in the library on Saturday morning to participate.

10. If we are comparing the blood pressure of old people who live near an airport with those who live away from an airport, the dependent variable is

- A) location.
 B) blood pressure.
 C) stress.
 D) distance from the airport.

11. In the preceding question, the most appropriate statistical test would be
- A) the chi-square test.
 - B) the Wilcoxon signed-ranks test.
 - C) Friedman's test.
 - D) the Student's t test.
12. In the text there was a stem-and-leaf display showing the performance of students who attended class regularly and those who often skipped class. Which of the following statement is not true?
- A) This display illustrated that poor attendees did more poorly than good attendees.
 - B) This display illustrated the shape of the two distributions.
 - C) This display illustrated the dispersion of the two distributions.
 - D) This display is a histogram.
13. On a recent fundraising drive, most of the 30 volunteers raised between \$100 and \$500 each. However, Mary and Ken each raised over \$5000. Which of the following is true?
- A) The amounts of money raised by Marry and Ken are outliers.
 - B) The data would best be represented three-dimensionally.
 - C) The data appear negatively skewed.
 - D) The data should be represented on a back-to-back stem-and-leaf display.
14. Which of the following is not a method of describing data that reduces the role of outliers on the measurement of a data set's variability?
- A) interquartile range
 - B) boxplot
 - C) range
 - D) trimmed statistics
15. Knowing that data are normally distributed allows me to
- A) calculate the total number of obtaining a score greater than some specified value.
 - B) calculate the probability of obtaining a score of exactly 1.
 - C) calculate what range of values are unlikely to occur by chance.
 - D) A) and C) but not B)
16. The symbol p is commonly used to refer to
- A) any value for the observed variable.
 - B) the probability for the occurrence of obtaining a score greater than an observation.
 - C) a value from a standard normal distribution.
 - D) the probability of type II error.
17. A linear transformation of data
- A) multiplies all scores by a constant and/or adds some constant to all scores.
 - B) is illegal.
 - C) drastically changes the shape of a distribution.
 - D) causes the data to form a straight line.
18. Which of the following is a good reason to convert data to z scores?
- A) We think that it is easier for people to work with round numbers.
 - B) We want to make a skewed set of data into a normally distributed set of data.
 - C) We want to be able to estimate probabilities or proportions easily.
 - D) All of the above.

19. Assume that your class took an exam last week and the mean and standard deviation of the exam were 85 and 5, respectively. Your instructor told you that 40 percent of the students had a score of 90 or above. You would probably
- A) think that your instructor was out of her mind.
 - B) decide that your score of 80 would probably fall in the failing range.
 - C) conclude that such a set of scores could not possibly happen.
 - D) conclude that the scores were not normally distributed.
20. The central feature of all hypothesis testing procedures is
- A) the sample mean.
 - B) a sampling distribution.
 - C) a range of outcomes.
 - D) the type of experiment we run.
21. To look at the sampling distribution of the mean we would
- A) calculate a mean and compare it to the standard deviation.
 - B) calculate a mean and compare it to the standard error.
 - C) calculate many means and plot them.
 - D) look the sampling distribution up in a book.
22. Whether or not we reject the null hypothesis depends on
- A) how far the data depart from what we would expect if the null were true.
 - B) the probability of the result given the null hypothesis is false.
 - C) the sample size.
 - D) all of the above.
23. We are most likely to reject a null hypothesis if the test statistic we compute is
- A) very small.
 - B) quite extreme.
 - C) what we would expect if the null hypothesis were true.
 - D) equal to the number of observations in the sample.
24. The difference between a test comparing two means and a test comparing the frequency of two outcomes is
- A) the test statistics that they employ and their calculation.
 - B) the logic behind the two different hypothesis testing procedures.
 - C) the way we go about drawing conclusions from the tests.
 - D) all of the above.
25. Sometimes we reject the null hypothesis when it is true. This is referred to as
- A) a Type I error.
 - B) a Type II error.
 - C) a mistake.
 - D) good fortune.
26. We would like to
- A) maximize the power of a test.
 - B) minimize the probability of a Type I error.
 - C) run tests that never make errors.
 - D) do A) and B) but not C).
27. A two-tailed test is _____ powerful than a one-tailed test if the difference is in the direction that we would have predicted.
- A) more

- B) less
C) equally
D) we cannot tell.
28. The correlation between two variables is defined as
A) the covariance of those variables divided by the variance of X .
B) the covariance of those variables divided by the variance of Y .
C) the covariance of those variables divided by the product of their standard deviations.
D) the cross-product of all of the pairs of scores.
29. Spearman's correlation coefficient (r_s) applies to
A) categorical data.
B) linear data.
C) data that have been converted to ranks.
D) only continuous data.
30. When we restrict the range of X or Y , we may
A) lower the correlation from what it would otherwise be.
B) raise the correlation from what it might be.
C) leave the correlation the same as it would otherwise be.
D) all of the above are possible.
31. If the correlation between the rating of cookie quality and cookie price is .30, and the critical value from the table of significance of correlation coefficients is .35, we would say that
A) the correlation is not significant.
B) the correlation is significant.
C) the difference is too close to call.
D) we don't have any way to come to a conclusion.
32. Which of the following represents a closer relationship between two variables?
A) $r = .00$
B) $r = .50$
C) $r = -.30$
D) $r = -.65$
33. The covariance will always
A) be a positive number.
B) reflect the direction of the relationship.
C) be less than 1.0.
D) be larger than the variance.
34. In testing the significance of a correlation coefficient, the degrees of freedom are
A) N
B) $N - 1$
C) $N - 2$
D) $N - 3$
35. If the correlation between X and Y is negative, the slope of the regression equation must be
A) negative
B) positive
C) non-significant
D) it could be either A) or B).

36. When the slope of the regression line is positive, the line goes from
- A) upper left to lower right.
 - B) lower left to upper right.
 - C) the line is flat.
 - D) it depends on the intercept.
37. The “best fitting line” is that regression line that
- A) minimizes the errors of prediction.
 - B) minimizes each squared error of prediction.
 - C) minimizes the sum of squared errors of prediction.
 - D) hits the most points as it goes through the scatterplot.
38. When we think in terms of standardized data, the slope of the regression line represents
- A) the change in X for a one unit change in Y.
 - B) the covariance between X and Y.
 - C) the height of the regression line.
 - D) the number of standard deviations Y will differ for a one standard deviation difference in X.
39. The standard error of estimate is given by
- A) $s_y = \sqrt{\frac{\sum(Y - \bar{Y})^2}{N - 1}}$
 - B) $s_y = \sqrt{\frac{\sum(Y - \hat{Y})^2}{N - 1}}$
 - C) $s_y = \sqrt{\frac{\sum(Y - \bar{Y})^2}{N - 2}}$
 - D) none of the above.
40. An important thing about r^2 is that it represents a measure of
- A) causal relationships
 - B) accountable variability.
 - C) the correlation.
 - D) statistical significance.
41. Which of the following is not part of the Central Limit Theorem?
- A) the mean of the sampling distribution equals the population mean.
 - B) the variance of the sampling distribution equals the population variance.
 - C) the sampling distribution will approach a normal distribution as the sample size increases.
 - D) the standard error of the mean equals the population standard deviation divided by the square root of the sample size.
42. The difference between the values of degrees of freedom for one sample t tests and related means t tests is that
- A) related means t tests have a $df = N - 2$, where N is the number of *pairs* of scores.
 - B) related means t tests have a $df = N$, where N is the number of *pairs* of scores.
 - C) related means t tests have a $df = N - 1$, where N is the number of *pairs* of scores.
 - D) one sample t tests have a $df = N - 2$, where N is the total number of *raw* scores.

43. The reason why we need to solve for t instead of z in some situations relates to
- the sampling distribution of the mean.
 - the sampling distribution of the sample size.
 - the sampling distribution of the variance.
 - the size of our sample mean.
44. Which of the following does not *directly* affect the magnitude of t ?
- the actual obtained difference ($\bar{X} - \mu$)
 - the magnitude of the sample variance (s^2)
 - the sample size (N)
 - the population variance (σ^2).
45. Which of the following is sometimes a serious problem with repeated measures designs?
- Carry-over effects can cloud the interpretation.
 - Small sample sizes can distort the results more than with other designs.
 - They require more subjects than designs with independent samples.
 - All of the above.
46. When we have an independent sample t test, the degrees of freedom are equal to
- N .
 - $N - 1$
 - $N_1 + N_2 - 1$
 - $N_1 + N_2 - 2$
47. In which of the following cases is it most useful to pool the variances?
- $s_1^2 = 7.3, N_1 = 15$ and $s_2^2 = 8.1, N_2 = 15$
 - $s_1^2 = 8.4, N_1 = 13$ and $s_2^2 = 12.1, N_2 = 19$
 - $s_1^2 = 7.3, N_1 = 15$ and $s_2^2 = 52.3, N_2 = 6$
 - none of the above
48. In the text the author complained about being asked "how many subjects do I need." His point was that this is a more complex question than it seems because you need to consider:
- how many subjects you have available.
 - how many subjects it would be convenient to run.
 - how many subjects your animal welfare committee will accept.
 - what the treatment effect is.
49. Which of the following is not a critical element of the analysis of variance?
- The variance of the total sample.
 - The variance within each group.
 - The variance of the means.
 - The difference between the means.
50. According to the following analysis of variance summary table, how many subjects were there in this experiment?
- | Source | df | SS | MS | F | p |
|--------|------|------|------|-----|------|
| Group | 3 | 18 | 6 | 3 | .031 |
| Error | 28 | 56 | 2 | | |
| Total | 31 | 74 | | | |
- 31.
 - 10.
 - 8.
 - 16.