IOP 201-Q (Industrial Psychological Research)
Tutorial 7

TRUE/FALSE [1 point each]
Indicate whether the sentence or statement is true or false.

____ 1. As defined in the text, random sampling requires sampling with replacement.

____ 2. If there are 50 students in a class, then the probability of randomly selecting any particular individual is $p = 1/50$.

____ 3. For any normal distribution, the mean and the median will have the same value.

____ 4. For any normal distribution, the proportion in the tail beyond $z = –2.00$ is $p = –0.0228$.

____ 5. For any normal distribution, a *z*-score of $z = –0.25$ separates the highest 59.87% of the scores from the rest of the distribution.

____ 6. The mean of the distribution of sample means is called the *standard error* of $\bar{x}$.

____ 7. The standard error of $\bar{x}$ can never be greater than the standard deviation of the population from which the sample is selected.

____ 8. The distribution of sample means based on samples of $n = 4$ selected from a population with $\mu = 80$ and $\sigma = 20$ will have a standard error of 5.

____ 9. A sample of $n = 25$ scores has a standard error of 2. This sample was selected from a population with $\sigma = 50$.

____ 10. If the data provide convincing evidence that the treatment does have a real effect, then the statistical decision is to reject the null hypothesis.

____ 11. One way to reduce the risk of a Type I error is to use a larger sample.

____ 12. If the null hypothesis were rejected using a one-tailed test, then it certainly would be rejected if the researcher had used a two-tailed test.

____ 13. The larger the sample size, the larger the *df* value for the t statistic.

____ 14. Estimated standard error is computed from σ^2.

____ 15. Increasing the alpha level from $\alpha = .01$ to $\alpha = .05$ will produce an increase in the estimated standard error.

____ 16. The larger the value for *df*, the more a *t* distribution resembles a normal distribution.

____ 17. For a hypothesis test using a *t* statistic, the boundaries for the critical region will change if the sample size is changed. (Assume all other factors are held constant).

____ 18. Two separate samples, each with $n = 30$ scores, from the same population will produce identical *t* statistics if the two sample means are equal.

____ 19. In general, a small value (near zero) for a *t* statistic will result in rejecting the null hypothesis.

____ 20. For the independent-measures *t* statistic, $df = (n_1 + 1) + (n_2 + 1)$.

____ 21. An increase in sample variance will produce an increase in the value for the *t* statistic (farther from zero).

____ 22. For a two-tailed hypothesis with an independent-measures *t* statistic using two samples, each with $n = 10$ scores, the boundaries for the critical region using $\alpha = .05$ are $t = \pm 2.101$.

____ 23. *Homogeneity of variance* assumes that the two population variances are equal.

____ 24. With a repeated-measures design, it is possible to evaluate the difference between two treatments using only one sample of subjects.

____ 25. The formula and calculations for the repeated-measures *t* statistic are identical to those for the single-sample *t* except that you use difference scores (*d* values) instead of *X* values.

____ 26. In general, as the variance of the difference scores increases, the magnitude of the *t* statistic also increases.

____ 27. For a repeated-measures study, when the variance for the difference scores is small, it is an indication that the difference between treatment conditions is fairly consistent for all of the subjects.

____ 28. The null hypothesis for a repeated-measures *t* test states that $\mu_d = 0$.

____ 29. Repeated-measures designs are particularly well-suited to research questions concerning changes that occur over time.

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 30. A jar contains 40 red marbles and 10 black marbles. If you take a random sample of a marble from this jar, what is the probability that the marble will be red?

A 10/50
B 40/50
C 10/40
D Cannot be determined with the information given

____ 31. What proportion of a normal distribution is located in the tail beyond a *z*-score of $z = -1.50$?

A –0.668
B –0.9332
C 0.0668
D 0.9332

____ 32. For a normal distribution, what *z*-score value separates the lowest 20% of the distribution from the highest 80%?

A $z = 0.20$
B $z = 0.80$
C $z = 0.84$
D $z = -0.84$

____ 33. What proportion of a normal distribution is located between $z = 1.00$ and $z = 1.50$?

A 0.0919
B 0.7745
C 0.5000
D 0.2255

____ 34. For a normal distribution with $\mu = 60$ and $\sigma = 8$, the probability of selecting a score greater than $X = 64$ is equal to _____.

A The proportion of the distribution with z-scores greater than 0.50
B The proportion of the distribution with z-scores greater than 1.00
C The proportion of the distribution with z-scores greater than 2.00
D The proportion of the distribution with z-scores greater than 4.00

____ 35. Scores on the SAT form a normal distribution with $\mu = 500$ and $\sigma = 100$. The State College accepts students whose SAT scores are in the top 60% of the distribution. What is the minimum SAT score needed for admission to the State College?

A 440
B 460
C 475
D 525

____ 36. The standard deviation of the distribution of sample means is called _____.

A The expected value of $\bar{x}$
B The standard error of $\bar{x}$
C The sample standard deviation
D The central limit standard deviation

____ 37. When a random sample is selected from a population, the sample mean is not expected to be exactly equal to the population mean. On average, the distance between a sample mean and the population mean is predicted by _____.

A The standard error
B The expected value
C The mean of the population
D The standard deviation of the population

____ 38. Which of the following samples would have a standard error of 2 points?

A $n = 5$ scores from a population with $\sigma = 10$
B $n = 5$ scores from a population with $\sigma = 20$
C $n = 100$ scores from a population with $\sigma = 10$
D $n = 100$ scores from a population with $\sigma = 20$

____ 39. For a particular population a sample of $n = 4$ scores has a standard error of 10. For the same population, a sample of $n = 16$ scores would have a standard error of _____.

A 2.5
B 5
C 10
D 20

____ 40. A random sample of $n = 4$ scores is obtained from a population with $\sigma = 10$. If the sample mean were 10 points greater than the population mean, then the sample mean would have a *z*-score of _____.

A +10.00
B +2.00
C +1.00
D Cannot be determined without knowing the population mean

____ 41. A random sample is selected from a population with $\mu = 80$ and $\sigma = 10$. To ensure a standard error of 2 points or less, the sample size should be at least ____.

A $n = 5$
B $n = 10$
C $n = 25$
D It is impossible to obtain a standard error less than 2 for any sized sample.

____ 42. The null hypothesis _____.

A States that the treatment has no effect
B Is denoted by the symbol H_1
C Is always stated in terms of sample statistics
D All of the above

____ 43. In general, increasing the alpha level (for example from .01 to .05) will _____.

A Increase the likelihood of rejecting the null hypothesis
B Decrease the likelihood of rejecting the null hypothesis
C Not affect the likelihood of rejecting the null hypothesis

____ 44. A sample of n = 25 individuals is selected from a population with μ = 80 and a treatment is administered to the sample. If the treatment has no effect, then

A The sample mean should be very different from 80 and should lead you to reject the null hypothesis
B The sample mean should be very different from 80 and should lead you to fail to reject the null hypothesis
C The sample mean should be close to 80 and should lead you to reject the null hypothesis
D The sample mean should be close 80 and should lead you to fail to reject the null hypothesis

____ 45. The probability of committing a Type I error _____.

A Is determined solely by the size of the treatment effect
B Cannot be controlled by the experimenter
C Is determined by the level of significance that one chooses
D Is determined by the value for beta (β) one selects

____ 46. A researcher expects a treatment to produce an increase in the population mean. Assuming a normal distribution, what is the critical z-score for a one-tailed test with α = .01?

A +2.33
B ±2.58
C +1.65
D ±2.33

____ 47. If a treatment has a very small effect, then a hypothesis test evaluating the treatment effect is likely to _____.

A Result in a Type I error
B Result in a Type II error
C Correctly reject the null hypothesis
D Correctly fail to reject the null hypothesis

____ 48. To calculate a *t* statistic, what information is needed from the sample?

A The value for n
B The value for $\bar{x}$
C The value for s or s^2
D All of the above are needed to compute *t*.
E No sample values are needed to compute *t*.

____ 49. When n is small (less than 30), the *t* distribution _____.

A Is identical in shape to the normal *z* distribution
B Is flatter and more spread out than the normal *z* distribution
C Is taller and narrower than the normal *z* distribution
D Cannot be specified, making hypothesis tests impossible

____ 50. With $\alpha = .05$ and $df = 8$, the critical value for a one-tailed *t* test is $t = 1.860$. Assuming all other factors are held constant, if the *df* value were increased to $df = 20$, the critical value of t would _____.

A Increase
B Decrease
C Stay the same
D Not enough information to answer

____ 51. A sample of $n = 25$ scores produces a *t* statistic of $t = -2.05$. If the researcher is using a two-tailed test with $\alpha = .05$, the correct statistical decision is _____.

A Reject the null hypothesis
B Fail to reject the null hypothesis
C Cannot answer without additional information

____ 52. An important assumption for the *t* test is that _____.

A The population distribution is normal
B The sample size be less than 30
C The value for σ is known
D The *t* distribution is normal

____ 53. An independent-measures *t* hypothesis test is appropriate when _____.

A The value for σ is known
B The mean for a treated group of subjects is compared to a known population mean
C One sample is used to test a hypothesis about one population
D There are two separate samples containing different subjects

____ 54. An independent-measures experiment uses two samples with $n = 7$ in each to compare two experimental treatments. The *t* statistic from this experiment will have degrees of freedom equal to _____.

A 12
B 6
C 13
D 9

____ 55. The results of an independent-measures research study are reported as "$t(5) = -2.12$, $p > .05$, two tails." What statistical decision was made?

A The researcher failed to reject H_0.
B The null hypothesis was rejected.
C There was a marginally significant effect.
D Cannot be determined from the researcher's statement

____ 56. A repeated-measures study would not be appropriate for which of the following situations?

A A researcher would like to study the effect of practice on performance.
B A researcher would like to compare individuals from two different populations.
C The effect of a treatment is studied in a small group of individuals with a rare disease.
D A developmental psychologist examines how behavior unfolds by observing the same group of children at different ages.

____ 57. What is the value of $\bar{d}$ for the following set of difference scores?
Scores: 3, –8, 6, –4, –2

A –1
B –5
C 23
D 23/5 = 4.6

____ 58. A research report describing the results from a repeated-measures study states, "The data showed a significant difference between treatments, $t(22) = 4.71$, $p < .05$." From this report you can conclude that the outcome of the hypothesis test was _____.

A To reject the null hypothesis.
B To fail to reject the null hypothesis
C It is impossible to determine whether or not the null hypothesis was rejected from the information given.

____ 59. What is the value of $s_{\bar{d}}$ for the following set of D-scores? Scores: 4, 8, 4, 4

A 12
B 2
C 4
D 1

____ 60. If the null hypothesis is true, on average the expected value for the related-samples t statistic is _____.

A 0
B 1
C 1.96
D $t > 1.96$

____ 61. An advantage of a repeated-measured design is that it reduces the contribution of error variability due to _____.

A $\overline{d}$
B Degrees of freedom
C The effect of the treatment
D Individual differences