Student name:\_\_\_\_\_\_\_\_\_\_

**MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.  
1)** A successful investor has decided to set up a scholarship fund for deserving students at her alma mater. Her plan is for the fund to be capable of awarding $25,000 annually in perpetuity. The first scholarship is to be awarded and paid out exactly four years from today. The funds will be deposited into an account immediately and will grow at a rate of 4%, compounded semiannually, for the foreseeable future. How much money must the investor donate today to fund the scholarship?

1) \_\_\_\_\_\_

A) $528,150.   
 B) $549,487.  
 C) $574,253.

**2)** An investment manager has a pool of five security analysts he can choose from to cover three different industries. In how many different ways can the manager assign one analyst to each industry?

2) \_\_\_\_\_\_

A) 60.   
 B) 10.  
 C) 125.

**3)** A company says that whether it increases its dividends depends on whether its earnings increase. From this we know:

3) \_\_\_\_\_\_

A) P(dividend increase | earnings increase) is not equal to P(earnings increase).   
 B) P(earnings increase | dividend increase) is not equal to P(earnings increase).  
 C) P(both dividend increase and earnings increase) = P(dividend increase).

**4)** Determining the number of ways five tasks can be done in order, requires:

4) \_\_\_\_\_\_

A) only the factorial function.   
 B) the permutation formula.  
 C) the labeling formula.

**5)** Which of the following is an a *priori* probability?

5) \_\_\_\_\_\_

A) The probability the Fed will lower interest rates prior to the end of the year.   
 B) For a stock, based on prior patterns of up and down days, the probability of the stock having a down day tomorrow.  
 C) On a random draw, the probability of choosing a stock of a particular industry from the S&P 500.

**6)** The probability of a new office building being built in town is 64%. The probability of a new office building that includes a coffee shop being built in town is 58%. If a new office building is built in town, the probability that it includes a coffee shop is *closest* to:

6) \_\_\_\_\_\_

A) 58%.   
 B) 37%.  
 C) 91%.

**7)** A firm is going to create three teams of four from twelve employees. How many ways can the twelve employees be selected for the three teams?

7) \_\_\_\_\_\_

A) 34,650.   
 B) 495.  
 C) 1,320.

**8)** The "likelihood" of an event occurring is defined as:

8) \_\_\_\_\_\_

A) an unconditional probability.   
 B) a conditional probability.  
 C) a joint probability.

**9)** Compute the present value of a perpetuity with $100 payments beginning four years from now. Assume the appropriate annual interest rate is 10%.

9) \_\_\_\_\_\_

A) $1,000.   
 B) $751.  
 C) $683.

**10)** Nikki Ali and Donald Ankard borrowed $15,000 to help finance their wedding and reception. The annual payment loan carries a term of seven years and an 11% interest rate. Respectively, the amount of the first payment that is interest and the amount of the second payment that is principal are *approximately*:

10) \_\_\_\_\_\_

A) $1,650; $1,702.   
 B) $1,650; $1,468.  
 C) $1,468; $1,702.

**11)** Marc Schmitz borrows $20,000 to be paid back in four equal annual payments at an interest rate of 8%. The interest amount in the second year’s payment would be:

11) \_\_\_\_\_\_

A) $6038.40.   
 B) $1116.90.  
 C) $1244.90.

**12)** Natalie Brunswick, neurosurgeon at a large U.S. university, was recently granted permission to take an 18-month sabbatical that will begin one year from today. During the sabbatical, Brunswick will need $2,500 at the beginning of each month for living expenses that month. Her financial planner estimates that she will earn an annual rate of 9% over the next year on any money she saves. The annual rate of return during her sabbatical term will likely increase to 10%. At the end of each month during the year before the sabbatical, Brunswick should save approximately:

12) \_\_\_\_\_\_

A) $3,505.00   
 B) $3,330.00  
 C) $3,356.00

**13)** A parking lot has 100 red and blue cars in it.  
 ● 40% of the cars are red.  
 ● 70% of the red cars have radios.  
 ● 80% of the blue cars have radios.  
 What is the probability that the car is red given that it has a radio?

13) \_\_\_\_\_\_

A) 47%.   
 B) 28%.  
 C) 37%.

**14)** Optimal Insurance is offering a deferred annuity that promises to pay 10% per annum with equal annual payments beginning at the end of 10 years and continuing for a total of 10 annual payments. For an initial investment of $100,000, what will be the amount of the annual payments?

14) \_\_\_\_\_\_

A) $42,212.   
 B) $38,375.  
 C) $25,937.

**15)** The real risk-free rate can be thought of as:

15) \_\_\_\_\_\_

A) exactly the nominal risk-free rate reduced by the expected inflation rate.   
 B) approximately the nominal risk-free rate plus the expected inflation rate.  
 C) approximately the nominal risk-free rate reduced by the expected inflation rate.

**16)** A local loan shark offers 4 for 5 on payday. What it involves is that you borrow $4 from him and repay $5 on the next payday (one week later). What would the stated annual interest rate be on this loan, with weekly compounding? Assuming 52 weeks in one year, what is the effective annual interest rate on this loan? Select the respective answer choices closest to your numbers.

16) \_\_\_\_\_\_

A) 25%; 300%.   
 B) 1,300%; 10,947,544%.  
 C) 25%; 1,300%.

**17)** At a charity fundraiser there have been a total of 342 raffle tickets already sold. If a person then purchases two tickets rather than one, how much *more likely* are they to win?

17) \_\_\_\_\_\_

A) 0.50.   
 B) 2.10.  
 C) 1.99.

**18)** Consider the following set of stock returns: 12%, 23%, 27%, 10%, 7%, 20%,15%. The third quartile is:

18) \_\_\_\_\_\_

A) 23%.   
 B) 20.0%.  
 C) 21.5%.

**19)** Jim Franklin recently purchased a home for $300,000 on which he made a down payment of $100,000. He obtained a 30-year mortgage to finance the balance on which he pays a fixed annual rate of 6%. If he makes regular, fixed monthly payments, what loan balance will remain just after the 48th payment?

19) \_\_\_\_\_\_

A) $186,109.   
 B) $192,444.  
 C) $189,229.

**20)** The probability of each of three independent events is shown in the table below. What is the probability of A and C occurring, but not B?

|  |  |
| --- | --- |
| Table 1: |  |
| **Event** | **Probability of Occurrence** |
| **A** | 25% |
| **B** | 15% |
| **C** | 42% |

20) \_\_\_\_\_\_

A) 8.9%.   
 B) 3.8%.  
 C) 10.5%.

**21)** Which of the following statements about probability is *most* accurate?

21) \_\_\_\_\_\_

A) A conditional probability is the probability that two or more events will happen concurrently.   
 B) An outcome is the calculated probability of an event.  
 C) An event is a set of one or more possible values of a random variable.

**22)** As the number of compounding periods increases, what is the effect on the EAR? EAR:

22) \_\_\_\_\_\_

A) increases at an increasing rate.   
 B) does not increase.  
 C) increases at a decreasing rate.

**23)** Elise Corrs, hedge fund manager and avid downhill skier, was recently granted permission to take a 4 month sabbatical. During the sabbatical, (scheduled to start in 11 months), Corrs will ski at approximately 12 resorts located in the Austrian, Italian, and Swiss Alps. Corrs estimates that she will need $6,000 at the beginning of each month for expenses that month. (She has already financed her initial travel and equipment costs.) Her financial planner estimates that she will earn an annual rate of 8.5% during her savings period and an annual rate of return during her sabbatical of 9.5%. How much does she need to put in her savings account at the end of each month for the next 11 months to ensure the cash flow she needs over her sabbatical? Each month, Corrs should save approximately:

23) \_\_\_\_\_\_

A) $2,070.   
 B) $2,080.  
 C) $2,065.

**24)** Distribution X has a mean of 10 and a standard deviation of 20. Distribution Y is identical to Distribution X in all respects except that each observation in Distribution Y is three times the value of a corresponding observation in Distribution X. The mean and standard deviation of Distribution Y are *closest* to:

|  |  |  |
| --- | --- | --- |
|  | **Mean** | **Standard deviation** |
| **A)** | 30 | 20 |
| **B)** | 10 | 60 |
| **C)** | 30 | 60 |

24) \_\_\_\_\_\_

A) Option A   
 B) Option B  
 C) Option C

**25)** Which of the following statements is *least* accurate regarding covariance?

25) \_\_\_\_\_\_

A) The covariance of a variable with itself is one.   
 B) Covariance can only apply to two variables at a time.  
 C) Covariance can exceed one.

**26)** If 10 equal annual deposits of $1,000 are made into an investment account earning 9% starting today, how much will you have in 20 years?

26) \_\_\_\_\_\_

A) $42,165.   
 B) $39,204.  
 C) $35,967.

**27)** To compare the returns over the past three years on a mutual fund to the returns on a certificate of deposit with annual compounding over the same period, an analyst is least likely to use the mutual fund’s annual:

27) \_\_\_\_\_\_

A) geometric mean return.   
 B) arithmetic mean return.  
 C) time-weighted return.

**28)** Selmer Jones has just inherited some money and wants to set some of it aside for a vacation in Hawaii one year from today. His bank will pay him 5% interest on any funds he deposits. In order to determine how much of the money must be set aside and held for the trip, he should use the 5% as a:

28) \_\_\_\_\_\_

A) required rate of return.   
 B) discount rate.  
 C) opportunity cost.

**29)** Given the following table about employees of a company based on whether they are smokers or nonsmokers and whether or not they suffer from any allergies, what is the probability of both suffering from allergies and not suffering from allergies?

|  |  |  |  |
| --- | --- | --- | --- |
| Table 2: | | | |
|  | **Suffer from Allergies** | **Don't Suffer from Allergies** | **Total** |
| **Smoker** | 35 | 25 | 60 |
| **Nonsmoker** | 55 | 185 | 240 |
| **Total** | 90 | 210 | 300 |

29) \_\_\_\_\_\_

A) 1.00.   
 B) 0.00.  
 C) 0.50.

**30)** There is a 40% chance that an investment will earn 10%, a 40% chance that the investment will earn 12.5%, and a 20% chance that the investment will earn 30%. What is the mean expected return and the standard deviation of expected returns, respectively?

30) \_\_\_\_\_\_

A) 17.5%; 5.75%.   
 B) 15.0%; 7.58%.  
 C) 15.0%; 5.75%.

**31)** An investor will receive an annuity of $5,000 a year for seven years. The first payment is to be received 5 years from today. If the annual interest rate is 11.5%, what is the present value of the annuity?

31) \_\_\_\_\_\_

A) $23,185.00   
 B) $15,000.00  
 C) $13,453.00

**32)** Compute the standard deviation of a two-stock portfolio if stock A (40% weight) has a variance of 0.0015, stock B (60% weight) has a variance of 0.0021, and the correlation coefficient for the two stocks is −0.35?

32) \_\_\_\_\_\_

A) 0.07%.   
 B) 2.64%.  
 C) 1.39%.

**33)** How much should an investor have in a retirement account on his 65th birthday if he wishes to withdraw $40,000 on that birthday and each of the following 14 birthdays, assuming his retirement account is expected to earn 14.5%?

33) \_\_\_\_\_\_

A) $272,977.   
 B) $234,422.  
 C) $274,422.

**34)** Based on the annual returns on a stock index over the last ten years, the arithmetic mean return is calculated as zero percent. It is *most likely* that the average compound rate of return for an investment in the index over that period is:

34) \_\_\_\_\_\_

A) positive.   
 B) zero.  
 C) negative.

**35)** Which of the following rules is used to calculate an unconditional probability?

35) \_\_\_\_\_\_

A) Addition rule.   
 B) Total probability rule.  
 C) Multiplication rule.

**36)** The probability of A is 0.4. The probability of AC is 0.6. The probability of (B | A) is 0.5, and the probability of (B | AC) is 0.2. Using Bayes’ formula, what is the probability of (A | B)?

36) \_\_\_\_\_\_

A) 0.125.   
 B) 0.625.  
 C) 0.375.

**37)** Which of the following is a joint probability? The probability that a:

37) \_\_\_\_\_\_

A) stock increases in value after an increase in interest rates has occurred.   
 B) stock pays a dividend and splits next year.  
 C) company merges with another firm next year.

**38)** What is the standard deviation of a portfolio if you invest 30% in stock one (standard deviation of 4.6%) and 70% in stock two (standard deviation of 7.8%) if the correlation coefficient for the two stocks is 0.45?

38) \_\_\_\_\_\_

A) 6.83%.   
 B) 0.38%.  
 C) 6.20%.

**39)** If X and Y are independent events, which of the following is *most* accurate?

39) \_\_\_\_\_\_

A) P(X or Y) = P(X) + P(Y).   
 B) P(X or Y) = (P(X)) × (P(Y)).  
 C) P(X | Y) = P(X).

**40)** Shawn Choate wants to choose a variable of study that has the most desirable statistical properties.  
 The statistic he is presently considering has the following characteristics:  
 ● The expected value of the sample mean is equal to the population mean.  
 ● The variance of the sampling distribution is smaller than that for other estimators of the parameter.  
 ● As the sample size increases, the standard error of the sample mean increases and the sampling distribution is centered more closely on the mean.  
   
 Choate’s estimator is:

40) \_\_\_\_\_\_

A) unbiased and consistent.   
 B) efficient and consistent.  
 C) unbiased and efficient.

**41)** Which of the following could be the set of all possible outcomes for a random variable that follows a binomial distribution?

41) \_\_\_\_\_\_

A) (1,2).   
 B) (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11).  
 C) (-1, 0,1).

**42)** For a test of the equality of the mean returns of two non-independent populations based on a sample, the numerator of the appropriate test statistic is the:

42) \_\_\_\_\_\_

A) larger of the two sample means.   
 B) average difference between pairs of returns.  
 C) difference between the sample means for each population.

**43)** The number of days a particular stock increases in a given five-day period is uniformly distributed between zero and five inclusive. In a given five-day trading week, what is the probability that the stock will increase exactly three days?

43) \_\_\_\_\_\_

A) 0.600.   
 B) 0.167.  
 C) 0.333.

**44)** Which of the following statements about a confidence interval for a population mean is *most* accurate?

44) \_\_\_\_\_\_

A) When a *z-statistic* is acceptable, a 95% confidence interval for a population mean is the sample mean plus-or-minus 1.96 times the sample standard deviation.   
 B) If the population variance is unknown, a large sample size is required in order to estimate a confidence interval for the population mean.  
 C) For a sample size of 30, using a t-statistic will result in a wider confidence interval for a population mean than using a z-statistic.

**45)** A stock price decreases in one period and then increases by an equal amount in the next period. The investor calculates a holding period return for each period and calculates their arithmetic mean. The investor also calculates the continuously compounded rate of return for each period and calculates the arithmetic mean of these. Which of the arithmetic means will be greater?

45) \_\_\_\_\_\_

A) The mean of the continuously compounded returns.   
 B) The mean of the holding period returns.  
 C) Neither, because both will equal zero.

**46)** Suppose the mean debt/equity ratio of the population of all banks in the United States is 20 and the population variance is 25. A banking industry analyst uses a computer program to select a random sample of 50 banks from this population and compute the sample mean. The program repeats this exercise 1000 times and computes the sample mean each time. According to the central limit theorem, the sampling distribution of the 1000 sample means will be approximately normal if the population of bank debt/equity ratios has:

46) \_\_\_\_\_\_

A) any probability distribution.   
 B) a normal distribution, because the sample is random.  
 C) a Student's *t*-distribution, because the sample size is greater than 30.

**47)** For a certain class of junk bonds, the probability of default in a given year is 0.2. Whether one bond defaults is independent of whether another bond defaults. For a portfolio of five of these junk bonds, what is the probability that zero or one bond of the five defaults in the year ahead?

47) \_\_\_\_\_\_

A) 0.4096.   
 B) 0.7373.  
 C) 0.0819.

**48)** A researcher is testing whether the average age of employees in a large firm is statistically different from 35 years (either above or below). A sample is drawn of 250 employees and the researcher determines that the appropriate critical value for the test statistic is 1.96. The value of the computed test statistic is 4.35. Given this information, which of the following statements is *least* accurate? The test:

48) \_\_\_\_\_\_

A) indicates that the researcher is 95% confident that the average employee age is different than 35 years.   
 B) indicates that the researcher will reject the null hypothesis.  
 C) has a significance level of 95%.

**49)** Cumulative Z-Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **z** | **0.04** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** |
| **1.2** | 0.8925 | 0.8944 | 0.8962 | 0.8980 | 0.8997 | 0.9015 |
| **1.3** | 0.9099 | 0.9115 | 0.9131 | 0.9147 | 0.9162 | 0.9177 |
| **1.4** | 0.9251 | 0.9265 | 0.9279 | 0.9292 | 0.9306 | 0.9319 |
| **1.5** | 0.9382 | 0.9394 | 0.9406 | 0.9418 | 0.9429 | 0.9441 |
| **1.6** | 0.9495 | 0.9505 | 0.9515 | 0.9525 | 0.9535 | 0.9545 |

Maria Huffman is the Vice President of Human Resources for a large regional car rental company. Last year, she hired Graham Brickley as Manager of Employee Retention. Part of the compensation package was the chance to earn one of the following two bonuses: if Brickley can reduce turnover to less than 30%, he will receive a 25% bonus. If he can reduce turnover to less than 25%, he will receive a 50% bonus (using a significance level of 10%). The population of turnover rates is normally distributed. The population standard deviation of turnover rates is 1.5%. A recent sample of 100 branch offices resulted in an average turnover rate of 24.2%. Which of the following statements is *most* accurate?

49) \_\_\_\_\_\_

A) Brickley should not receive either bonus.   
 B) For the 50% bonus level, the critical value is -1.65 and Huffman should give Brickley a 50% bonus.  
 C) For the 50% bonus level, the test statistic is -5.33 and Huffman should give Brickley a 50% bonus.

**50)** A stock increased in value last year. Which will be greater, its continuously compounded or its holding period return?

50) \_\_\_\_\_\_

A) Neither, they will be equal.   
 B) Its continuously compounded return.  
 C) Its holding period return.

**51)** Consider a random variable X that follows a continuous uniform distribution: 7 ≤ X ≤ 20. Which of the following statements is *least* accurate?

51) \_\_\_\_\_\_

A) F(10) = 0.23   
 B) F(12 ≤ X ≤ 16) = 0.307.  
 C) F(21) = 0.00.

**52)** A multivariate distribution is *best* defined as describing the behavior of:

52) \_\_\_\_\_\_

A) two or more independent random variables.   
 B) two or more dependent random variables.  
 C) a random variable with more than two possible outcomes.

**53)** A p-value of 0.02% means that a researcher:

53) \_\_\_\_\_\_

A) cannot reject the null hypothesis at either the 5% or 1% significance levels.   
 B) can reject the null hypothesis at both the 5% and 1% significance levels.  
 C) can reject the null hypothesis at the 5% significance level but cannot reject at the 1% significance level.

**54)** Which of the following statements regarding the central limit theorem (CLT) is *least* accurate? The CLT:

54) \_\_\_\_\_\_

A) holds for any population distribution, assuming a large sample size.   
 B) gives the variance of the distribution of sample means as σ2/n, where σ2 is the population variance and n is the sample size.  
 C) states that for a population with mean µ and variance σ2, the sampling distribution of the sample means for any sample of size n will be approximately normally distributed.

**55)** Which of the following statements about probability distributions is *most* *accurate*?

55) \_\_\_\_\_\_

A) A binomial distribution gives the probabilities only for whole number outcomes for a random variable.   
 B) A discrete uniform random variable has varying probabilities for each outcome that total to one.  
 C) A continuous uniform distribution has a lower limit but no upper limit.

**56)** When sampling from a population, the *most* appropriate sample size:

56) \_\_\_\_\_\_

A) is at least 30.   
 B) minimizes the sampling error and the standard deviation of the sample statistic around its population value.  
 C) involves a trade-off between the cost of increasing the sample size and the value of increasing the precision of the estimates.

**57)** A discount brokerage firm states that the time between a customer order for a trade and the execution of the order is uniformly distributed between three minutes and fifteen minutes. If a customer orders a trade at 11:54 A.M., what is the probability that the order is executed after noon?

57) \_\_\_\_\_\_

A) 0.250.   
 B) 0.750.  
 C) 0.500.

**58)** In addition to the usual parameters that describe a normal distribution, to completely describe 10 random variables, a multivariate normal distribution requires knowing the:

58) \_\_\_\_\_\_

A) 10 correlations.   
 B) 45 correlations.  
 C) overall correlation.

**59)** Critical values from Student’s t-distribution for a two-tailed test at a 5%  
 significance level:

|  |  |
| --- | --- |
| **df** |  |
| **28** | 2.048 |
| **29** | 2.045 |
| **30** | 2.042 |

A researcher wants to test a hypothesis that two variables have a population correlation coefficient equal to zero. For a sample size of 30, the appropriate critical value for this test is plus-or-minus:

59) \_\_\_\_\_\_

A) 2.048   
 B) 2.045  
 C) 2.042

**60)** What kind of test is being used for the following hypothesis and what would a z-statistic of 1.68 tell us about a hypothesis with the appropriate test and a level of significance of 5%, respectively?   
   
 H0: B ≤ 0   
   
 HA: B > 0

60) \_\_\_\_\_\_

A) Two-tailed test; fail to reject the null.   
 B) One-tailed test; reject the null.  
 C) One-tailed test; fail to reject the null.

**61)** Which of the following would *least* *likely* be categorized as a multivariate distribution?

61) \_\_\_\_\_\_

A) The returns of the stocks in the DJIA.   
 B) The return of a stock and the return of the DJIA.  
 C) The days a stock traded and the days it did not trade.

**62)** The sample mean is an unbiased estimator of the population mean because the:

62) \_\_\_\_\_\_

A) sample mean provides a more accurate estimate of the population mean as the sample size increases.   
 B) expected value of the sample mean is equal to the population mean.  
 C) sampling distribution of the sample mean has the smallest variance of any other unbiased estimators of the population mean.

**63)** An analyst wants to determine whether the mean returns on two stocks over the last year were the same or not. What test should she use, assuming returns are normally distributed?

63) \_\_\_\_\_\_

A) Chi-square test.   
 B) Paired comparisons test.  
 C) Difference in means test.

**64)** Which of the following is *least likely* a step in stratified random sampling?

64) \_\_\_\_\_\_

A) The sub-samples are pooled to create the complete sample.   
 B) The size of each sub-sample is selected to be the same across strata.  
 C) The population is divided into strata based on some classification scheme.

**65)** A range of estimated values within which the actual value of a population parameter will lie with a given probability of 1 − α is a(n):

65) \_\_\_\_\_\_

A) α percent point estimate.   
 B) (1 − α) percent confidence interval.  
 C) α percent confidence interval.

**66)** The probability density function of a continuous uniform distribution is *best* described by a:

66) \_\_\_\_\_\_

A) line segment with a 45-degree slope.   
 B) line segment with a curvilinear slope.  
 C) horizontal line segment.

**67)** The standard normal distribution is *most* completely described as a:

67) \_\_\_\_\_\_

A) symmetrical distribution with a mean equal to its median.   
 B) normal distribution with a mean of zero and a standard deviation of one.  
 C) distribution that exhibits zero skewness and no excess kurtosis.

**68)** Mei Tekei just celebrated her 22nd birthday. When she is 27, she will receive a $100,000 inheritance. Tekei needs funds for the down payment on a co-op in Manhattan and has found a bank that will give her the present value of her inheritance amount, assuming an 8.0% stated annual interest rate with continuous compounding. Will the proceeds from the bank be sufficient to cover her down payment of $65,000?

68) \_\_\_\_\_\_

A) Yes, Tekei will receive $68,058.   
 B) No, Tekei will only receive $61,878.  
 C) Yes, Tekei will receive $67,028.

**69)** The variance of 100 daily stock returns for Stock A is 0.0078. The variance of 90 daily stock returns for Stock B is 0.0083. Using a 5% level of significance, the critical value for this test is 1.61. The *most appropriate* conclusion regarding whether the variance of Stock A is different from the variance of Stock B is that the:

69) \_\_\_\_\_\_

A) variances are not equal.   
 B) variances are equal.  
 C) variance of Stock B is significantly greater than the variance of Stock A.

**70)** An article in a trade journal suggests that a strategy of buying the seven stocks in the S&P 500 with the highest earnings-to-price ratio at the end of the calendar year and holding them until March 20 of the following year produces significant trading profits. Upon reading further, you discover that the study is based on data from 1993 to 1997, and the earnings-to-price ratio is calculated using the stock price on December 31 of each year and the annual reported earnings per share for that year. Which of the following biases is *least likely* to influence the reported results?

70) \_\_\_\_\_\_

A) Time-period bias.   
 B) Look-ahead bias.  
 C) Survivorship bias.

**71)** An analyst conducts a two-tailed test to determine if mean earnings estimates are significantly different from reported earnings. The sample size is greater than 25 and the computed test statistic is 1.25. Using a 5% significance level, which of the following statements is *most* accurate?

71) \_\_\_\_\_\_

A) To test the null hypothesis, the analyst must determine the exact sample size and calculate the degrees of freedom for the test.   
 B) The analyst should reject the null hypothesis and conclude that the earnings estimates are significantly different from reported earnings.  
 C) The analyst should fail to reject the null hypothesis and conclude that the earnings estimates are not significantly different from reported earnings.

**72)** The average return on small stocks over the period 1926-1997 was 17.7%, and the standard deviation of the sample was 33.9%. Assuming returns are normally distributed, the 95% confidence interval for the return on small stocks next year is:

72) \_\_\_\_\_\_

A) −16.2% to 51.6%.   
 B) −48.7% to 84.1%.  
 C) 16.8% to 18.6%.

**73)** A sample of five numbers drawn from a population is (5, 2, 4, 5, 4). Which of the following statements concerning this sample is *most* *accurate*?

73) \_\_\_\_\_\_

A) The mean of the sample is ∑X / (n − 1) = 5.   
 B) The sample variance is: ∑(x1 − mean of the sample) 2 / (n − 1) = 1.5.  
 C) The sampling error of the sample mean is equal to the standard error of the sample.

**74)** A test of a hypothesis that the means of two normally distributed populations are equal based on two independent random samples:

74) \_\_\_\_\_\_

A) is done with a t-statistic.   
 B) is a paired-comparisons test.  
 C) is based on a chi-square statistic.

**75)** A cumulative distribution function for a random variable *X* is given as follows:

|  |  |
| --- | --- |
| ***x*** | ***F(x)*** |
| **5** | 0.14 |
| **10** | 0.25 |
| **15** | 0.86 |
| **20** | 1.00 |

The probability of an outcome less than or equal to 10 is:

75) \_\_\_\_\_\_

A) 25%.   
 B) 39%.  
 C) 14%.

**Answer Key**Test name: Quantitative Methods

1) B

The investor has to ensure that the amount deposited now will grow into the amount needed to fund the perpetuity. With semiannual compounding, the effective annual rate (EAR) earned on funds in the account is:  
formula1.mml  
 The present value of the perpetuity = $25,000/0.0404 = $618,811.88.  
 Note that since the first scholarship award is paid out in four years, the present value of the perpetuity represents the amount that must be in the account at time t = 3. We can find the required deposit from:  
 FV = −618,811.88; N = 3; I = 4.04; CPT → PV = $549,487.24 or 618, 811.88/1.04043 = $549,487.24

2) A

We can view this problem as the number of ways to choose three analysts from five analysts when the order they are chosen matters. The formula for the number of permutations is  
formula2.mml  
   
 On the TI financial calculator: 5 2nd nPr 3 = 60.  
   
 Alternatively, there are 5 2nd nCr 3 = 10 ways to select three of the five analysts, and for each group of selected analysts, there are 3! = 3 × 2 × 1 = 6 ways to assign them the three industries. Therefore, there are 10 × 6 = 60 ways to assign the industries to the analysts.

3) B

If two events A and B are dependent, then the conditional probabilities of P(A | B) and P(B | A) will not equal their respective unconditional probabilities (of P(A) and P(B), respectively). Both remaining choices may or may not occur, e.g., P(A | B) = P(B) is possible but not necessary.

4) A

The factorial function, denoted n!, tells how many different ways n items can be arranged where all the items are included.

5) C

A *priori* probability is based on formal reasoning and inspection. Given the number of stocks in the airline industry in the S&P500 for example, the a *priori* probability of selecting an airline stock would be that number divided by 500.

6) C

P(A|B) = P(AB) / P(B). The probability of a new coffee shop given a new office building is 58% / 64% = 90.63%.

7) A

This problem is a labeling problem where the 12 employees will be assigned one of three labels. It requires the labeling formula. There are [(12!) / (4! × 4! × 4!)] = 34,650 ways to group the employees.

8) B

“Likelihood” is defined in the Level I curriculum as a conditional probability, the probability of an observation, given a particular set of conditions (although, in general, it is often used as a synonym for probability). An unconditional probability refers to the probability of an event occurring regardless of past of future events. A joint probability is the probability that two events will both occur.

9) B

Compute the present value of the perpetuity at (t = 3). Recall, the present value of a perpetuity or annuity is valued one period before the first payment. So, the present value at t = 3 is 100 / 0.10 = 1,000. Now it is necessary to discount this lump sum to t = 0. Therefore, present value at t = 0 is 1,000 / (1.10)3 = 751.

10) A

*Step 1: Calculate the annual payment.*  
   
 Using a financial calculator (remember to clear your registers): PV = 15,000; FV = 0; I/Y = 11; N = 7; PMT = $3,183  
   
 *Step 2: Calculate the portion of the first payment that is interest.*  
   
 Interest1 = Principal × Interest rate = (15,000 × 0.11) = 1,650  
 *Step 3: Calculate the portion of the second payment that is principal.*  
   
 Principal1 = Payment − Interest1 = 3,183 − 1,650 = 1,533 (interest calculation is from Step 2) Interest2 = Principal remaining × Interest rate = [(15,000 − 1.533) × 0.11] = 1,481  
   
 Principal2 = Payment − Interest1 = 3,183 − 1,481 = 1,702

11) C

With PV = 20,000, N = 4, I/Y = 8, computed Pmt = 6,038.42. Interest (Yr1) = 20,000(0.08) = 1600.  
 Interest (Yr2) = (20,000 − (6038.42 − 1600))(0.08) = 1244.93

12) C

This is a two-step problem. First, we need to calculate the present value of the amount she needs over her sabbatical. (This amount will be in the form of an annuity due since she requires the payment at the beginning of the month.) Then, we will use future value formulas to determine how much she needs to save each month (ordinary annuity).  
   
 *Step 1: Calculate present value of amount required during the sabbatical*  
   
 Using a financial calculator: **Set to BEGIN Mode**, then N = 12 × 1.5 = 18; I/Y = 10 / 12 = 0.8333; PMT = 2,500; FV = 0; CPT → PV = 41,974  
   
 *Step 2: Calculate amount to save each month*  
   
 **Make sure the calculator is set to END mode**, then N = 12; I/Y = 9 / 12 = 0.75; PV = 0; FV = 41,974; CPT → PMT = -3,356

13) C

Given a set of prior probabilities for an event of interest, Bayes’ formula is used to update the probability of the event, in this case that the car we already know has a radio is red. Bayes’ formula says to divide the Probability of New Information given Event by the Unconditional Probability of New Information and multiply that result by the Prior Probability of the Event. In this case, P(red car has a radio) = 0.70 is divided by 0.76 (which is the Unconditional Probability of a car having a radio (40% are red of which 70% have radios) plus (60% are blue of which 80% have radios) or ((0.40) × (0.70)) + ((0.60) × (0.80)) = 0.76.) This result is then multiplied by the Prior Probability of a car being red, 0.40. The result is (0.70 / 0.76) × (0.40) = 0.37 or 37%.

14) B

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** |
| $ 100,000 | | | | | | | | | | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |

At the end of the 10-year deferral period, the value will be: $100,000 × (1 + 0.10)10 = $259,374.25. Using a financial calculator: N = 10, I = 10, PV = $100,000, PMT = 0, Compute FV = $259,374.25. Using a financial calculator and solving for a 10-year annuity due because the payments are made at the beginning of each period (you need to put your calculator in the “begin” mode), with a present value of $259,374.25, a number of payments equal to 10, an interest rate equal to ten percent, and a future value of $0.00, the resultant payment amount is $38,374.51. Alternately, the same payment amount can be determined by taking the future value after nine years of deferral ($235,794.77), and then solving for the amount of an ordinary (payments at the end of each period) annuity payment over 10 years.

15) C

The approximate relationship between nominal rates, real rates and expected inflation rates can be written as:   
   
 *Nominal risk-free rate = real risk-free rate + expected inflation rate.*   
   
 Therefore we can rewrite this equation in terms of the real risk-free rate as:   
   
 *Real risk-free rate = Nominal risk-free rate − expected inflation rate*   
   
 The exact relation is: (1 + real)(1 + expected inflation) = (1 + nominal)

16) B

Stated Weekly Rate = 5/4 − 1 = 25% Stated Annual Rate = 1,300%  
 Annual Effective Interest Rate = (1 + 0.25)52 − 1 = 109,476.44 − 1 = 10,947,544%

17) C

If you purchase one ticket, the probability of your ticket being drawn is 1/343 or 0.00292. If you purchase two tickets, your probability becomes 2/344 or 0.00581, so you are 0.00581 / 0.00292 = 1.99 times more likely to win.

18) A

The third quartile is calculated as: Ly = (7 + 1) (75/100) = 6. When we order the observations in ascending order: 7%, 10%, 12%, 15%, 20%, 23%, 27%, “23%” is the sixth observation from the left.

19) C

With monthly payments, we need a monthly rate: 6% / 12 = 0.5%. Next, solve for the monthly payment. The calculator keystrokes are: PV = 200,000; FV = 0; N = 360; I/Y = 0.5; CPT → PMT = −$1,199.10. The balance at any time on an amortizing loan is the present value of the remaining payments. There are 312 payments remaining after the 48th payment is made. The loan balance at this point is: PMT = −1,199.10; FV = 0; N = 312; I/Y = 0.5; CPT → PV = $189,228.90.  
 Note that only N has to be changed to calculate this new present value; the other inputs are unchanged.

20) A

Using the multiplication rule: (0.25)(0.42) − (0.25)(0.15)(0.42) = 0.08925 or 8.9%

21) C

Conditional probability is the probability of one event happening given that another event has happened. An outcome is the numerical result associated with a random variable.

22) C

There is an upper limit to the EAR as the frequency of compounding increases. In the limit, with continuous compounding the EAR = eAPR –1. Hence, the EAR increases at a decreasing rate.

23) B

This is a two-step problem. First, we need to calculate the present value of the amount she needs over her sabbatical. (This amount will be in the form of an annuity due since she requires the payment at the beginning of the month.) Then, we will use future value formulas to determine how much she needs to save each month.  
 *Step 1: Calculate present value of amount required during the sabbatical*  
 Using a financial calculator: Set to BEGIN Mode, then N = 4; I/Y = 9.5 / 12 = 0.79167; PMT = 6,000; FV = 0; CPT → PV = -23,719.  
 *Step 2: Calculate amount to save each month*  
 Using a financial calculator: Make sure it is set to END mode, then N = 11; I/Y = 8.5 / 12.0 = 0.70833; PV = 0; FV = 23,719; CPT → PMT= -2,081, or approximately $2,080.

24) C

If the observations in Distribution Y are three times the observations in Distribution X, the mean and standard deviation of Distribution Y are three times the mean and standard deviation of Distribution X. The standard deviation of a data set measured in feet, for example, will be 3 times the standard deviation of the data set measured in yards (since 1 yard = 3 feet).

25) A

The covariance of a variable with itself is its variance. Both remaining statements are true. Covariance represents the linear relationship between two variables and is not limited in value (i.e., it can range from negative infinity to positive infinity).

26) B

Switch to BGN mode. PMT = –1,000; N = 10, I/Y = 9, PV = 0; CPT → FV = 16,560.29. Remember the answer will be one year after the last payment in annuity due FV problems. Now PV10 = 16,560.29; N = 10; I/Y = 9; PMT = 0; CPT → FV = 39,204.23. Switch back to END mode.

27) B

The arithmetic mean will overstate the average annual compound return of the mutual fund. The average annual compound rate of return is calculated as the geometric mean return over the period. The annual time-weighted return is a geometric mean return.

28) B

He needs to figure out how much the trip will cost in one year, and use the 5% as a discount rate to convert the future cost to a present value. Thus, in this context the rate is best viewed as a discount rate.

29) B

These are mutually exclusive, so the joint probability is zero.

30) B

Mean = (0.4)(10) + (0.4)(12.5) + (0.2)(30) = 15%  
 Var = (0.4)(10 − 15)2 + (0.4)(12.5 − 15)2 + (0.2)(30 − 15)2 = 57.5  
 Standard deviation = √57.5 = 7.58

31) B

With PMT = 5,000; N = 7; I/Y = 11.5; value (at t = 4) = 23,185.175. Therefore, PV (at t = 0) = 23,185.175 / (1.115)4 = $15,000.68.

32) B

The standard deviation of the portfolio is found by:   
   
 [w12σ12 + w22σ22 + 2w1w2σ1σ2ρ1,2]0.5  
   
 = [(0.40)2(0.0015) + (0.60)2(0.0021) + (2)(0.40)(0.60)(0.0387)(0.0458)(−0.35)]0.5   
   
 = 0.0264, or 2.64%.

33) C

This is an annuity due so set your calculator to the BGN mode. N = 15; I/Y = 14.5; PMT = –40,000; FV = 0; CPT → PV = 274,422.50. Switch back to END mode.

34) C

Unless the returns were equal for all ten years (unlikely), the geometric mean return over the period will be less than the arithmetic mean return.

35) B

Given a mutually exclusive and exhaustive set of outcomes for random variable R, the total probability rule for expected value states that the unconditional expected value of R is the sum of the conditional expected values of R for each outcome multiplied by their probabilities:   
   
 E(R) = E(R | S1) × P(S1) + E(R | S2) × P(S2) + ... + E(R | Sn) × P(Sn)

36) B

Using the total probability rule, we can compute the   
   
 P(B): P(B) = [P(B | A) × P(A)] + [P(B | AC) × P(AC)]   
   
 P(B) = [0.5 × 0.4] + [0.2 × 0.6] = 0.32   
   
 Using Bayes’ formula, we can solve for   
   
 P(A | B): P(A | B) = [ P(B | A) ÷ P(B) ] × P(A) = [0.5 ÷ 0.32] × 0.4 = 0.625

37) B

A joint probability applies to two events that both must occur.

38) C

The standard deviation of the portfolio is found by:   
   
   
 [W12σ12 + W22σ22 + 2W1W2σ1σ2r1,2]0.5,  
   
   
 or [(0.30)2(0.046)2 + (0.70)2(0.078)2 + (2)(0.30)(0.70)(0.046)(0.078)(0.45)]0.5 = 0.0620, or 6.20%.

39) C

Note that events being independent means that they have no influence on each other. It does not necessarily mean that they are mutually exclusive. Accordingly, P(X or Y) = P(X) + P(Y) − P(X and Y). By the definition of independent events, P(X|Y) = P(X).

40) C

The estimator is unbiased because the expected value of the sample mean is equal to the population mean. The estimator is efficient because the variance of the sampling distribution is smaller than that for other estimators of the parameter. The estimator is not consistent. To be consistent, as the sample size increases, the standard error of the sample mean must decrease.

41) B

This reflects a basic property of binomial outcomes. They take on whole number values that must start at zero up to the upper *limit* *n*. The upper limit in this case is 11.

42) B

A hypothesis test of the equality of the means of two normally distributed non-independent populations (hypothesized mean difference = 0) is a t-test and the numerator is the average difference between the sample returns over the sample period.

43) B

If the possible outcomes are X: (0,1,2,3,4,5), then the probability of each of the six outcomes is 1 / 6 = 0.167.

44) C

Although the *t*-distribution begins to approach the shape of a normal distribution for large sample sizes, at a sample size of 30 a *t*-statistic produces a wider confidence interval than a *z*-statistic. A confidence interval for the population mean is the sample mean plus-or-minus the appropriate critical value times the *standard error*, which is the standard deviation divided by the square root of the sample size. If a population is normally distributed, we can use a *t*-statistic to construct a confidence interval for the population mean from a small sample, even if the population variance is unknown.

45) B

The holding period returns will have a positive arithmetic mean. For example, a fall from 100 to 90 is a decrease of 10%, but a rise from 90 to 100 is an increase of 11.1%.  
   
 The continuously compounded returns will have an arithmetic mean of zero. Using the same example values, ln (90/100) = −10.54% and ln (100/90) = 10.54%.

46) A

The central limit theorem tells us that for a population with a mean µ and a finite variance σ 2, the sampling distribution of the sample means of all possible samples of size *n* will be approximately normally distributed with a mean equal to µ and a variance equal to σ 2/n, *no matter the distribution of the population*, assuming a large sample size.

47) B

The outcome follows a binomial distribution where n = 5 and p = 0.2. In this case p(0) = 0.85 = 0.3277 and p(1) = 5 × 0.84 × 0.2 = 0.4096, so P(X=0 or X=1) = 0.3277 + 0.4096.

48) C

This test has a *significance level* *of 5%*. The relationship between confidence and significance is: significance level = 1 – confidence level. We know that the significance level is 5% because the sample size is large and the critical value of the test statistic is 1.96 (2.5% of probability is in both the upper and lower tails).

49) C

Using the process of Hypothesis testing:   
   
 *Step 1: State the Hypothesis.* For 25% bonus level - Ho: m ≥ 30% Ha: m < 30%; For 50% bonus level - Ho: m ≥ 25% Ha: m < 25%.   
   
 *Step 2: Select Appropriate Test Statistic.* Here, we have a normally distributed population with a known variance (standard deviation is the square root of the variance) and a large sample size (greater than 30.) Thus, we will use the *z*-statistic.   
   
 *Step 3: Specify the Level of Significance.* α = 0.10.   
   
 *Step 4: State the Decision Rule.* This is a one-tailed test. The critical value for this question will be the *z*-statistic that corresponds to an α of 0.10, or an area to the left of the mean of 40% (with 50% to the right of the mean). Using the *z*-table (normal table), we determine that the appropriate critical value = -1.28 *(Remember that we highly recommend that you have the “common” z-statistics memorized!)*   
   
 Thus, we will reject the null hypothesis if the calculated test statistic is less than -1.28.   
   
 *Step 5: Calculate sample (test) statistics.* Z (for 50% bonus) = (24.2 − 25) / (1.5 / √ 100) = − **5.333**. Z (for 25% bonus) = (24.2 − 30) / (1.5 / √ 100) = − **38.67**.   
   
 *Step 6: Make a decision.* Reject the null hypothesis for both the 25% and 50% bonus level because the test statistic is less than the critical value. Thus, Huffman should give So berg a 50% bonus. The other statements are false. The critical value of −1.28 is based on the significance level, and is thus the same for both the 50% and 25% bonus levels.

50) C

When a stock increases in value, the holding period return is always greater than the continuously compounded return that would be required to generate that holding period return. For example, if a stock increases from $1 to $1.10 in a year, the holding period return is 10%. The continuously compounded rate needed to increase a stock's value by 10% is Ln(1.10) = 9.53%.

51) C

F(21) = 1.00. For a cumulative distribution function, the expression F(x) refers to the probability of an outcome less than or equal to x. In this distribution all the possible outcomes are between 7 and 20. Therefore the probability of an outcome less than or equal to 21 is 100%.  
   
   
 The other choices are true.  
   
 A. F(10) = (10 − 7) / (20 − 7) = 3 / 13 = 0.23  
   
 B. F(12 ≤ X ≤ 16) = F(16) − F(12) = [(16 − 7) / (20 − 7)] − [(12 − 7) / (20 − 7)] = 0.692 − 0.385 = 0.307

52) B

A multivariate distribution describes the relationships between two or more random variables, when the behavior of each random variable is dependent on the others in some way.

53) B

A p-value of 0.02% means that the smallest significance level at which the hypothesis can be rejected is 0.0002, which is smaller than 0.05 or 0.01. Therefore the null hypothesis can be rejected at both the 5% and 1% significance levels.

54) C

This question is asking you to select the inaccurate statement. The CLT states that for a population with mean µ and a finite variance σ2, the sampling distribution of the sample means becomes approximately normally distributed *as the sample size* *becomes large*. The other statements are accurate.

55) A

Binomial probability distributions give the result of a single outcome and are used to study discrete random variables where you want to know the probability that an exact event will happen. A continuous uniform distribution has both an upper and a lower limit. A discrete uniform random variable has equal probabilities for each outcome.

56) C

A larger sample reduces the sampling error and the standard deviation of the sample statistic around its population value. However, this does not imply that the sample should be as large as possible, or that the sampling error must be as small as can be achieved. Larger samples might contain observations that come from a different population, in which case they would not necessarily improve the estimates of the population parameters. Cost also increases with the sample size. When the cost of increasing the sample size is greater than the value of the extra precision gained, increasing the sample size is not appropriate.

57) B

The limits of the uniform distribution are three and 15. Since the problem concerns time, it is continuous. Noon is six minutes after 11:54 A.M. The probability the order is executed after noon is (15 − 6) / (15 − 3) = 0.75.

58) B

The number of correlations in a multivariate normal distribution of *n* variables is computed by the formula ((n) × (n-1)) / 2, in this case (10 × 9) / 2 = 45.

59) A

The test statistic for a hypothesis test concerning population correlation follows a t-distribution with n − 2 degrees of freedom. For a sample size of 30 and a significance level of 5%, the sample statistic must be greater than 2.048 or less than −2.048 to reject the hypothesis that the population correlation equals zero.

60) B

The way the alternative hypothesis is written you are only looking at the right side of the distribution. You are only interested in showing that B is greater than 0. You don't care if it is less than zero. For a one-tailed test at the 5% level of significance, the critical  *z* value is 1.645. Since the test statistic of 1.68 is greater than the critical value we would reject the null hypothesis.

61) C

The number of days a stock traded and did not trade describes only one random variable. Both of the other cases involve two or more random variables.

62) B

An unbiased estimator is one for which the expected value of the estimator is equal to the parameter you are trying to estimate.

63) B

Portfolio theory teaches us that returns on two stocks over the same time period are unlikely to be independent since both have some systematic risk. Because the samples are not independent, a paired comparisons test is appropriate to test whether the means of the two stocks’ returns distributions are equal. A difference in means test is not appropriate because it requires that the samples be independent. A chi-square test compares the variances of two samples, rather than their means.

64) B

In stratified random sampling we first divide the population into subgroups, called strata, based on some classification scheme. Then we randomly select a sample from each stratum and pool the results. *The size of the samples from each strata is based on the relative size of the strata relative to the population and are not necessarily the same across strata.*

65) B

A 95% confidence interval for the population mean (α = 5%), for example, is a range of estimates within which the actual value of the population mean will lie with a probability of 95%. Point estimates, on the other hand, are *single* (sample) values used to estimate population parameters. There is no such thing as a α percent *point estimate* or a (1 − α) percent *cross-sectional point estimate.*

66) C

By definition, for a continuous uniform distribution, the probability density function is a horizontal line segment over a range of values such that the area under the segment (total probability of an outcome in the range) equals one.

67) B

The standard normal distribution is defined as a normal distribution that has a mean of zero and a standard deviation of one. The other choices apply to any normal distribution.

68) C

Because the rate is 8% compounded continuously, the effective annual rate is e0.08 - 1 = 8.33%. To find the present value of the inheritance, enter N=5, I/Y=8.33, PMT=0, FV=100,000 CPT PV = 67,028.   
   
 Alternatively, 100,000e-0.08(5) = 67,032.

69) B

A test of the equality of variances requires an F-statistic. The calculated F-statistic is 0.0083/0.0078 = 1.064. Since the calculated F value of 1.064 is less than the critical F value of 1.61, we cannot reject the null hypothesis that the variances of the 2 stocks are equal.

70) C

Survivorship bias is not likely to significantly influence the results of this study because the authors looked at the stocks in the S&P 500 at the beginning of the year and measured performance over the following three months. Look-ahead bias could be a problem because earnings-price ratios are calculated and the trading strategy implemented at a time before earnings are actually reported. Finally, the study is conducted over a relatively short time period during the long bull market of the 1990s. This suggests the results may be time-specific and the result of time-period bias.

71) C

The null hypothesis is that earnings estimates are equal to reported earnings. To reject the null hypothesis, the calculated test statistic must fall outside the two critical values. IF the analyst tests the null hypothesis with a z-statistic, the critical values at a 5% confidence level are ±1.96. Because the calculated test statistic, 1.25, lies between the two critical values, the analyst should fail to reject the null hypothesis and conclude that earnings estimates are not significantly different from reported earnings. If the analyst uses a *t*-statistic, the upper critical value will be even greater than 1.96, never less, so even without the exact degrees of freedom the analyst knows any t-test would fail to reject the null.

72) B

A 95% confidence interval is ± 1.96 standard deviations from the mean, so 0.177 ± 1.96(0.339) = (− 48.7%, 84.1%).

73) B

The mean of the sample is ∑X / n = 20 / 5 = 4. The sampling error of the sample is the difference between a sample statistic and its corresponding population parameter.

74) A

We have two formulas for test statistics for the hypothesis of equal sample means. Which one we use depends on whether or not we assume the samples have equal variances. Either formula generates a test statistic that follows a T-distribution.

75) A

A cumulative distribution function (cdf) gives the probability of an outcome for a random variable less than or equal to a specific value. For the random variable *X*, the cdf for the outcome 10 is 0.25, which means there is a 25% probability that *X* will take a value less than or equal to 10.