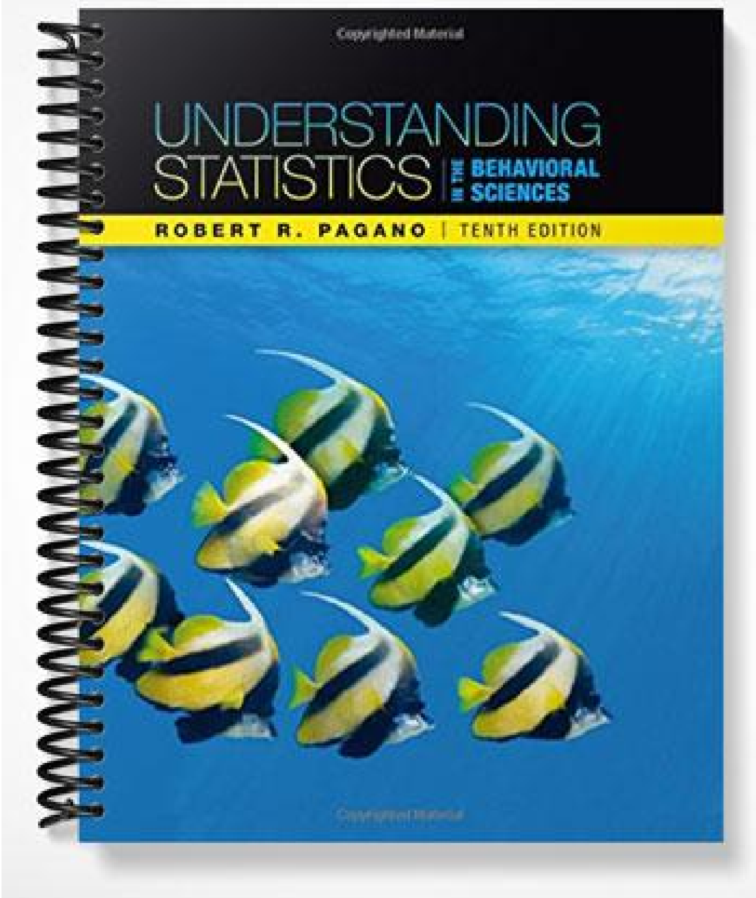
TEST BANK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UNDERSTANDING
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IN THE
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CHAPTER 2

BASIC MATHEMATICAL AND MEASUREMENT CONCEPTS

LEARNING OBJECTIVES

After completing Chapter 2, students should be able to:

1. Assign subscripts using the *X* variable to a set of numbers.
2 Do the operations called for by the summation sign for various values of *i* and *N*.
3. Specify the differences in mathematical operations between $(\Sigma X)^2$ and ΣX^2 and compute each.
4. Define and recognize the four measurement scales, give an example of each, and state the mathematical operations that are permissible with each scale.
5. Define continuous and discrete variables, and give an example of each.
6. Define the real limits of a continuous variable; and determine the real limits of values obtained when measuring a continuous variable.
7. Round numbers with decimal remainders.
8. Understand the illustrative examples, do the practice problems and understand the solutions.

DETAILED CHAPTER SUMMARY

I. Study Hints for the Student

A Review basic algebra but don't be afraid that the mathematics will be too hard.

B. Become very familiar with the notations in the book.

C. Don't fall behind. The material in the book is cumulative and getting behind is a bad idea.

D. Work problems!

II Mathematical Notation

A. Symbols. The symbols X (capital letter X) and sometimes Y will be used as symbols to represent variables measured in the study.

1. For example, X could stand for age, or height, or IQ in any given study.
2. To indicate a specific observation a subscript on X will be used; e.g., X_2 would mean the second observation of the X variable.

B. Summation sign. The summation sign (Σ) is used to indicate the fact that the scores following the summation sign are to be added up. The notations above and below the Σ sign are used to indicate the first and last scores to be summed.

C. Summation rules.

1. The sum of the values of a variable plus a constant is equal to the sum of the values of the variable plus N times the constant. In equation form $\sum_{i=1}^{N}(X_i + a) = \sum_{i=1}^{N} X_i + Na$

2. The sum of the values of a variable minus a constant is equal to the sum of the variable minus N times the constant. In equation form

$$\sum_{i=1}^{N}(X_i - a) = \sum_{i=1}^{N} X_i - Na$$

3. The sum of a constant times the values of a variable is equal to the constant times the sum of the values of the variable. In equation form

$$\sum_{i=1}^{N} aX_i = a\sum_{i=1}^{N} X_i$$

4. The sum of a constant divided into the values of a variable is equal to the constant divided into the sum of the values of the variable. In equation form

$$\sum_{i=1}^{N}(X_i / a) = (\sum_{i=1}^{N} X_i) / a$$

III. Measurement Scales.

A. Attributes. All measurement scales have one or more of the following three attributes.

1. Magnitude.
2. Equal intervals between adjacent units.
3. Absolute zero point.

B. Nominal scales. The nominal scale is the lowest level of measurement. It is more qualitative than quantitative. Nominal scales are comprised of elements that have been classified as belonging to a certain category. For example, whether someone's sex is male or female. Can only determine whether $A = B$ or $A \neq B$.

C. Ordinal scales. Ordinal scales possess a relatively low level of the property of magnitude. The rank order of people according to height is an example of an ordinal scale. One does not know how much taller the first rank person is over the second rank person. Can determine whether $A > B$, $A = B$ or $A < B$.

D. Interval scales. This scale possesses equal intervals, magnitude, but no absolute zero point. An example is temperature measured in degrees Celsius. What is called zero is actually the freezing point of water, not absolute zero. Can do same determinations as ordinal scale, plus can determine if $A - B = C - D$, $A - B > C - D$, or $A - B < C - D$.

E. Ratio scales. These scales have the most useful characteristics since they possess attributes of magnitude, equal intervals, and an absolute zero point. All mathematical operations can be performed on ratio scales. Examples include height measured in centimeters, reaction time measured in milliseconds.

IV. Additional Points Concerning Variables

A. Continuous variables. This type can be identified by the fact that they can theoretically take on an infinite number of values between adjacent units on the scale. Examples include length, time and weight. For example, there are an infinite number of possible values between 1.0 and 1.1 centimeters.

B. Discrete variables. In this case there are no possible values between adjacent units on the measuring scale. For example, the number of people in a room has to be measured in discrete units. One cannot reasonably have 6 1/2 people in a room.

C. Continuous variables. All measurements on a continuous variable are approximate. They are limited by the accuracy of the measurement instrument. When a measurement is taken, one is actually specifying a range of values and calling it a specific value. The real limits of a continuous variable are those values that are above and below the recorded value by 1/2 of the smallest measuring unit of the scale (e.g., the real limits of 100°C are 99.5° C and 100.5° C, when using a thermometer with accuracy to the nearest degree).

D. Significant figures. The number of decimal places in statistics is established by tradition. The advent of calculators has made carrying out laborious calculations much less cumbersome. Because solutions to problems often involve a large number of intermediate steps, small rounding inaccuracies can become large errors. Therefore, the more decimals carried in intermediate calculations, the more accurate is the final answer. It is standard practice to carry to one or more decimal places in intermediate calculations than you report in the final answer.

E. Rounding. If the remainder beyond the last digit is greater than 1/2 add one to the last digit. If the remainder is less than 1/2 leave the last digit the same. If the remainder is equal to 1/2 add one to the last digit if it is an odd number, but if it is even, leave it as it is.

TEACHING SUGGESTIONS AND COMMENTS

This is also a relatively easy chapter. The chapter flows well and I suggest that you lecture following the text. Some specific comments follow:

1. Subscripting and summation. If you want to use new examples, an easy opportunity to do so, without confusing the student is to use your own examples to illustrate subscripting and summation. It is very important that you go over the difference between the operations called for by $\sum X^2$ and $\sum X$. These terms appear often throughout the textbook, particularly in conjunction with computing standard deviation and variance. If students are not clear on the distinction and don't learn how to compute each now, it can cause them a lot of trouble down the road. They also get some practice in Chapter 4. I suggest that you use your own numbers to illustrate the difference. It adds a little variety without causing confusion. Regarding summation, I usually go over in detail, explaining the

use of the terms beneath and above the summation sign, as is done in the textbook. However, I don't require that students learn the summation rules contained in note 2.1, p. 44.

2. Measurement scales. The material on measurement scales is rather straight forward with the following exceptions.

   a. Regarding nominal scales, students often confuse the concepts that there is no quantitative relationship between the units of a nominal scale and that it is proper to use a ratio scale to count items within each unit (category). Be sure to discuss this. Going through an example usually clears up this confusion.
   b. Students sometimes have a problem understanding the mathematical operations that are allowed by each measuring scale, except of course, the mathematical operations allowed with a ratio scale, since all are allowed. A few examples usually helps. Again, I recommend using your own numbers with these examples

3. Real limits of a continuous variable. This topic can be a little confusing to some students. However, a few examples explained in conjunction with the definition on p. 35 seems to work well in dispelling this confusion.

4. Rounding. This is an easy section with the exception of rounding when the decimal remainder is ½. To help correct this, I suggest you go over several examples. I recommend you make up your own examples since it is easy to do so and adds some variety. Students sometime wonder why such a complicated rule is used and ask, "Why not just round up." The answer is that if you did this systematically over many such roundings, it would introduce a systematic upwards bias.

DISCUSSION QUESTIONS

1. Are the mathematical operations called for by $\sum X^2$ the same as those called for by $\left(\sum X\right)^2$? Use an example to illustrate your answer.

2. The Psychology Department faculty is considering four candidates for a faculty position. Each of the current twenty faculty members rank orders the four candidates, giving each a rank of 1, 2, 3, or 4, with a rank of "1" being the highest choice and a rank of "4" being the lowest. The twenty rankings given for each candidate are then averaged and the candidate with the value closest to "1" is offered the job. Is this a legitimate procedure? Discuss.

3. The procedure for rounding when the decimal remainder is ½ seems a bit cumbersome. Why do you think it is used? Discuss.

4. Does it make sense to talk about the real limits of a discrete variable? Discuss.

TEST QUESTIONS

Multiple Choice

1. Given the following subjects and scores, which symbol would be used to represent the score of 3?

Subject	1	2	3	4	5
Score	12	21	8	3	30

a. X_8
b. X_4
c. X_3
d. X_2

ANS: b OTHER: www

2. We have collected the following data:

$$X_1 = 6,\ X_2 = 2,\ X_3 = 4,\ X_4 = 1,\ X_5 = 3$$

For these data, $\sum_{i=1}^{N-1} X_i$ is equal to _________.

a. 16
b. 10
c. 7
d. 13

ANS: d OTHER: www

3. Reaction time in seconds is an example of a(n) _________ scale.

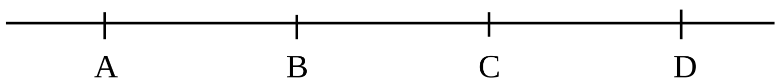
a. ratio
b. ordinal
c. interval
d. nominal

ANS: a

4. After performing several clever calculations on your calculator, the display shows the answer 53.655001. What is the appropriate value rounded to two decimal places?
a. 53.65
b. 53.66
c. 53.64
d. 53.60

ANS: b

5. Consider the following points on a scale:



If the scale upon which *A*, *B*, *C*, and *D* are arranged is a nominal scale, we can say _________.
a. $B = 2A$
b. $B - A = D - C$
c. both a and b
d. neither a nor b

ANS: d

6. When rounded to two decimal places, the number 3.175000 becomes _________.
a. 3.17
b. 3.20
c. 3.18
d. 3.10

ANS: c OTHER: www

7. Given the data $X_1 = 1$, $X_2 = 4$, $X_3 = 5$, $X_4 = 8$, $X_5 = 10$, evaluate Σ X.
a. 1
b. 18
c. 27
d. 28

ANS: d

8. Given the data $X_1 = 1$, $X_2 = 4$, $X_3 = 5$, $X_4 = 8$, $X_5 = 10$, evaluate ΣX^2.
   a. 56
   b. 784
   c. 206
   d. 28

   ANS: c

9. Given the data $X_1 = 1$, $X_2 = 4$, $X_3 = 5$, $X_4 = 8$, $X_5 = 10$, evaluate $(\Sigma X)^2$.
   a. 56
   b. 784
   c. 206
   d. 28

   ANS: b

10. Given the data $X_1 = 1$, $X_2 = 4$, $X_3 = 5$, $X_4 = 8$, $X_5 = 10$, evaluate $\sum_{i=2}^{4} X_i$.
    a. 17
    b. 27
    c. 28
    d. 23

    ANS: a

11. Given the data $X_1 = 1$, $X_2 = 4$, $X_3 = 5$, $X_4 = 8$, $X_5 = 10$, evaluate $\sum_{i=2}^{N} X_i + 5$.
    a. 53
    b. 47
    c. 48
    d. 32

    ANS: d

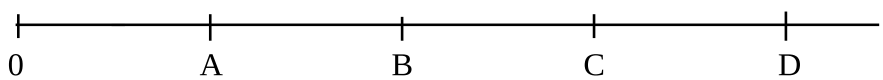
12. Given the data $X_1 = 1$, $X_2 = 4$, $X_3 = 5$, $X_4 = 8$, $X_5 = 10$, evaluate $\sum_{i=2}^{N} \left(X_i + 5\right)$.
    a. 47
    b. 53
    c. 48
    d. 32

    ANS: a

13. A discrete scale of measurement __________.
    a. is the same as a continuous scale
    b. provides exact measurements
    c. necessarily uses whole numbers
    d. b and c

    ANS: b

14. Consider the following points on a scale:



    If the scale upon which *A*, *B*, *C*, and *D* are arranged is an interval scale, we can say __________.
    a. $B = 2A$
    b. $B - A = D - C$
    c. both a and b
    d. neither a nor b

    ANS: b OTHER: www

15. The number 83.476499 rounded to three decimal places is __________.
    a. 83.477
    b. 83.480
    c. 83.476
    d. 83.470

    ANS: c

16. The number 9.44650 rounded to two decimal places is __________.
    a. 99.45
    b. 99.46
    c. 99.44
    d. 99.40

    ANS: a

17. "Brand of soft drink" is measured on a(n) __________.
    a. nominal scale
    b. ordinal scale
    c. interval scale
    d. ratio scale

    ANS: a

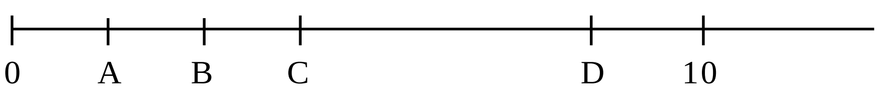
18. At the annual sailing regatta, prizes are awarded for 1st, 2nd, 3rd, 4th, and 5th place. These "places" comprise a(n) _________.
   a. nominal scale
   b. ordinal scale
   c. interval scale
   d. ratio scale

   ANS: b

19. Which of the following numbers is rounded incorrectly to two decimal places?
   a. $10.47634 \rightarrow 10.48$
   b. $15.36485 \rightarrow 15.36$
   c. $21.47500 \rightarrow 21.47$
   d. $8.24501 \rightarrow 8.25$
   e. $6.66500 \rightarrow 6.66$

   ANS: c

20. Consider the following points on a scale:



   If the scale upon which points A, B, C, and D are shown is an ordinal scale, we can meaningfully say _________.
   a. $B - A < D - C$
   b. $B < C/2$
   c. $B = 2A$
   d. C>B

   ANS: d

21. A continuous scale of measurement is different than a discrete scale in that a continuous scale _________.
   a. is an interval scale, not a ratio scale
   b. never provides exact measurements
   c. can take an infinite number of intermediate possible values
   d. never uses decimal numbers
   e. b and c

   ANS: e

22. Sex of children is an example of a(n) _________ scale.
    a. ratio
    b. nominal
    c. ordinal
    d. interval

    ANS: b

23. Which of the following variables has been labeled with an incorrect measuring scale?
    a. the <u>number of students</u> in a psychology class - ratio
    b. <u>ranking</u> in a beauty contest - ordinal
    c. <u>finishing order</u> in a poetry contest - ordinal
    d. <u>self-rating of anxiety level</u> by students in a statistics class - ratio

    ANS: d

24. A nutritionist uses a scale that measures weight to the nearest 0.01 grams. A slice of cheese weighs 0.35 grams on the scale. The variable being measured is a _________.
    a. discrete variable
    b. constant
    c. continuous variable
    d. random variable

    ANS: c

25. A nutritionist uses a scale that measures weight to the nearest 0.01 grams. A slice of cheese weighs 0.35 grams on the scale. The true weight of the cheese _________.
    a. is 0.35 grams
    b. may be anywhere in the range 0.345-0.355 grams
    c. may be anywhere in the range 0.34-0.35 grams
    d. may be anywhere in the range 0.34-0.36 grams

    ANS: b

26. In a 10-mile cross-country race, all runners are randomly assigned an identification number. These numbers represent a(n) _________.
    a. nominal scale
    b. ratio scale
    c. interval scale
    d. ordinal scale

    ANS: a

27. In the race mentioned in question 26, a comparison of each runner's finishing time would represent a(n) _________.
a. nominal scale
b. ratio scale
c. interval scale
d. ordinal scale

ANS: b

28. The sum of a distribution of 40 scores is 150. If we add a constant of 5 to each score, the resulting sum will be _________.
a. 158
b. 350
c. 150
d. 195

ANS: b

29. Given the following set of numbers, $X_1 = 2$, $X_2 = 4$, $X_3 = 6$, $X_4 = 10$, what is the value for ΣX?
a. 12
b. 156
c. 480
d. 22

ANS: d OTHER: Study Guide

30. Given the following set of numbers, $X_1 = 2$, $X_2 = 4$, $X_3 = 6$, $X_4 = 10$, what is the value of ΣX^2?
a. 156
b. 22
c. 480
d. 37

ANS: a OTHER: Study Guide; www

31. Given the following set of numbers, $X_1 = 2$, $X_2 = 4$, $X_3 = 6$, $X_4 = 10$, what is the value of $X_4{}^2$?
a. 4
b. 6
c. 100
d. 10

ANS: c OTHER: Study Guide

32. Given the following set of numbers, $X_1 = 2$, $X_2 = 4$, $X_3 = 6$, $X_4 = 10$, what is the value of $(\Sigma X)^2$?
a. 480
b. 484
c. 156
d. 44

ANS: b OTHER: Study Guide

33. Given the following set of numbers, $X_1 = 2$, $X_2 = 4$, $X_3 = 6$, $X_4 = 10$, what is the value of N?
a. 2
b. 4
c. 6
d. 10

ANS: b OTHER: Study Guide

34. Given the following set of numbers, $X_1 = 2$, $X_2 = 4$, $X_3 = 6$, $X_4 = 10$, what is the value of $(\Sigma X)/N$?
a. 5
b. 4
c. 6
d. 5.5

ANS: d OTHER: Study Guide

35. Classifying subjects on the basis of sex is an example of using what kind of scale?
a. nominal
b. ordinal
c. interval
d. ratio
e. bathroom

ANS: a OTHER: Study Guide; www

36. Number of bar presses is an example of a(n) _______ variable.
a. discrete
b. continuous
c. nominal
d. ordinal

ANS: a OTHER: Study Guide

37. Using an ordinal scale to assess leadership, which of the following statements is appropriate?
    a. *A* has twice as much leadership ability as *B*
    b. *X* has no leadership ability
    c. *Y* has the most leadership ability
    d. all of the above

    ANS: c OTHER: Study Guide

38. The number of legs on a centipede is an example of a(an) _______ scale.
    a. nominal
    b. ordinal
    c. ratio
    d. continuous

    ANS: c OTHER: Study Guide

39. What are the real limits of the observation of 6.1 seconds (measured to the nearest second)?
    a. 6.05-6.15
    b. 5.5-6.5
    c. 6.0-6.2
    d. 6.00-6.20

    ANS: a OTHER: www

40. What is 17.295 rounded to one decimal place?
    a. 17.1
    b. 17.0
    c. 17.2
    d. 17.3

    ANS: d OTHER: Study Guide

41. What is the value of 0.05 rounded to one decimal place?
    a. 0.0
    b. 0.1
    c. 0.2
    d. 0.5

    ANS: a OTHER: Study Guide

42. The symbol "Σ" means:
    a. add the scores
    b. summarize the data
    c. square the value
    d. multiply the scores

    ANS: a OTHER: Study Guide

43. A therapist measures the difference between two clients. If the therapist can say that Rebecca's score is higher than Sarah's, but can't specify how much higher, the measuring scale used must have been a(an)_______ scale.
    a. nominal
    b. ordinal
    c. interval
    d. ratio

    ANS: b OTHER: www

44. An individual is measuring various objects. If the measurements made are to determine into which of six categories each object belongs, the measuring scale used must have been a(an)_______ scale.
    a. nominal
    b. ordinal
    c. interval
    d. ratio

    ANS: a

45. If an investigator determines that Carlo's score is five times as large as the score of Juan, the measuring scale used must have been a(an)_______ scale.
    a. nominal
    b. ordinal
    c. interval
    d. ratio

    ANS: d OTHER: www

The following questions test basic algebra

46. Where $3X = 9$, what is the value of X?
    a. 3
    b. 6
    c. 9
    d. 12

    ANS: a OTHER: Study Guide

47. For $X + Y = Z$, X equals _______.
    a. $Y + Z$
    b. $Z - Y$
    c. Z/Y
    d. Y/Z

    ANS: b OTHER: Study Guide

48. $1/X + 2/X$ equals _______.
    a. $2/X$
    b. $3/2X$
    c. $3/X$
    d. $2/X^2$

    ANS: c OTHER: Study Guide

49. What is $(4 - 2)(3 \cdot 4)/(6/3)$?
    a. 24
    b. 1.3
    c. 12
    d. 6

    ANS: c OTHER: Study Guide

50. $6 + 4 \times 3 - 1$ simplified is _______.
    a. 29
    b. 48
    c. 71
    d. 17

    ANS: d OTHER: Study Guide

51. $X = Y/Z$ can be expressed as _______.
    a. $Y = (Z)(X)$
    b. $X = Z/Y$
    c. $Y = X/Z$
    d. $Z = X + Y$

    ANS: a OTHER: Study Guide

52. 2^4 equals _______.
    a. 4
    b. 32
    c. 8
    d. 16

    ANS: d OTHER: Study Guide

53. $\sqrt{81}$ equals _______.
    a. ±3
    b. ±81
    c. ±9
    d. ±27

    ANS: c OTHER: Study Guide

54. $X(Z + Y)$ equals _______.
    a. $XZ + Y$
    b. $ZX + YX$
    c. $(X)(Y)(Z)$
    d. $(Z + Y)/X$

    ANS: b OTHER: Study Guide

55. 1/2 + 1/4 equals _______.
    a. 1/6
    b. 1/8
    c. 2/8
    d. 3/4

    ANS: d OTHER: Study Guide

56. X^6/X^2 equals _______.
    a. X^8
    b. X^4
    c. X^2
    d. X^3

    ANS: b OTHER: Study Guide

True/False

1. When doing summation, the number above the summation sign indicates the term ending the summation and the number below indicates the beginning term.

   ANS: T OTHER: www

2. ΣX^2 and $(\Sigma X)^2$ generally yield the same answer.

   ANS: F OTHER: www

3. With nominal scales there is a numerical relationship between the units of the scale.

   ANS: F

4. If IQ was measured on a ratio scale, and John had an IQ of 40 and Fred an IQ of 80, it would be correct to say that Fred was twice as intelligent as John.

   ANS: T

5. An ordinal scale possesses the attributes of magnitude and equal interval.

   ANS: F

6. Most scales used for measuring psychological variables are either ratio or interval.

   ANS: F

7. Measurement is always approximate with a continuous variable.

   ANS: T OTHER: www

8. It is standard practice to carry all intermediate calculations to four more decimal places than will be reported in the final answer.

   ANS: F

9. In rounding, if the remainder beyond the last digit is greater than 1/2, add one to the last digit. If the remainder is less than 1/2, leave the last digit as it is.

   ANS: T

10. It is legitimate to do ratios with interval scaling.

    ANS: F

11. The number of students in a class is an example of a continuous variable.

    ANS: F

12. The real limits of a discrete variable are those values that are above and below the recorded value by one half of the smallest measuring unit of the scale.

    ANS: F

13. When rounding, if the decimal remainder is equal to ½ and the last digit of the answer is even, add 1 to the last digit of the answer.

    ANS: F

14. A fundamental property of a nominal scale is equivalence.

    ANS: T

15. An interval scale is like a ratio scale, except that the interval scale doesn't possess an absolute zero point.

    ANS: T

16. A discrete variable requires nominal or interval scaling.

    ANS: T OTHER: www

17. Classifying students into whether they are good, fair, or poor speakers is an example of ordinal scaling.

    ANS: T

18. Determining the number of students in each section of introductory psychology involves the use of a ratio scale.

    ANS: T OTHER: www

19. In a race, Sam came in first and Fred second. Determining the difference in time to complete the race between Sam and Fred involves an ordinal scale

    ANS: T

20. If the remainder of a number = ½, we always round the last digit up.

    ANS: F

21. All scales possess magnitude, equal intervals between adjacent units, and an absolute zero point.

    ANS: F OTHER: Study Guide; New

22. Nominal scales can be used either qualitatively or quantitatively.

    ANS: F OTHER: Study Guide; New

23. With an ordinal scale one cannot be certain that the magnitude of the distance between any two adjacent points is the same.

    ANS: T OTHER: Study Guide; New

24. With the exception of division, one can perform all mathematical operations on a ratio scale.

    ANS: F OTHER: Study Guide; New

25. The average number of children in a classroom is an example of a discrete variable.

    ANS: F OTHER: Study Guide; New

26. When a weight is measured to 1/1000th of a gram, that measure is absolutely accurate.

    ANS: F OTHER: Study Guide; New

27. If the quantity $\Sigma X = 400.3$ for N observations, then the quantity ΣX will equal 40.03 if each of the original observations is multiplied by 0.1.

    ANS: T OTHER: Study Guide; New

28. One generally has to specify the real limits for discrete variables since they cannot be measured accurately.

    ANS: F OTHER: Study Guide; New

29. The symbol Σ means square the following numbers and sum them.

    ANS: F OTHER: Study Guide; New

30. Rounding 55.55 to the nearest whole number gives 55.

    ANS: F OTHER: Study Guide; New

Short Answer

1. Define continuous variable.

   OTHER: www

2. Define discrete variable.

3. Define interval scale.

4. Define nominal scale.

5. Define ratio scale.

   OTHER: www

6. Define real limits of a continuous variable.

7. How does an interval scale differ from an ordinal scale?

8. Give two differences between continuous and discrete scales.

9. What are the four types of scales and what mathematical operations can be done with each?

10. Prove algebraically that $\sum_{i=1}^{N}(X_i + a) = \sum_{i=1}^{N} X_i + Na$.

11. What is a discrete variable? Give an example.

12. Student A claims that because his IQ is twice that of Student B, he is twice as smart as Student B. Is student A correct? Explain.

13. What is meant by “the real limits of a continuous variable.”

    OTHER: www

14. The faculty of a psychology department are trying to decide between three candidates for a single faculty position. The department chairperson suggests that to decide, each faculty person should rank order the candidates from 1 to 3, and the ranks would then be averaged. The candidate with the highest average would be offered the position. Mathematically, what is wrong with that proposal.

    OTHER: www

15. Consider the following sample scores for the variable weight:

    $X_1 = 145$, $X_2 = 160$, $X_3 = 110$, $X_4 = 130$, $X_5 = 137$, $X_6 = 172$, and $X_7 = 150$

    a. What is the value for $\sum X$?
    b. What is the value for $\sum_{i=3}^{6} X_i$?
    c. What is the value for $\sum X^2$?
    d. What is the value for $\left(\sum X\right)^2$?
    e. What is the value for $\sum (X+4)$?
    f. What is the value for $\sum X - 140$?
    g. What is the value for $\sum (X - 140)$?

    OTHER: Study Guide; New

16. Round the following values to one decimal place.

    a. 25.15
    b. 25.25
    c. 25.25001
    d. 25.14999
    e. 25.26

    OTHER: Study Guide; New

17. State the real limits for the following values of a continuous variable.

    a. 100 (smallest unit of measurement is 1)
    b. 1.35 (smallest unit of measurement is 0.01)
    c. 29.1 (smallest unit of measurement is 0.1)

    OTHER: Study Guide; New

18. Indicate whether the following variables are discrete or continuous.

    a. The age of an experimental subject.
    b. The number of ducks on a pond.
    c. The reaction time of a subject on a driving task.
    d. A rating of leadership on a 3-point scale.

    OTHER: Study Guide; New

19. Identify which type of measurement scale is involved for the following:

    a. The sex of a child.
    b. The religion of an individual
    c. The rank of a student in an academic class.
    d. The attitude score of a subject on a prejudice inventory.
    e. The time required to complete a task.
    f. The rating of a task as either "easy," "mildly difficult," or "difficult."

    OTHER: Study Guide; New

20. In an experiment measuring the number of aggressive acts of six children, the following scores were obtained.

Subject	Number of Aggressive Acts
1	15
2	25
3	5
4	18
5	14
6	22

    a. If X represents the variable of "Number of Aggressive Acts", assign each of the scores its appropriate X symbol.
    b. Compute ΣX for these data.

    OTHER: Study Guide; New

21. Given the following sample scores for the variable length (cm):

$$X_1 = 22,\ X_2 = 35,\ X_3 = 32,\ X_4 = 43,\ X_5 = 28$$

    a. What is the value for $\sum(X+4)$?
    b. What is the value for $\sum X - 15$?
    c. What is the value for $\sum(X - 15)$?

    OTHER: Study Guide; New

22. Using the scores in Problem 21:

    a. What is the value for $\sum\left(\frac{X}{3}\right)$?

    b. What is the value for $\sum 5X$?

    OTHER: Study Guide; New

23. Using the scores in Problem 21:

    a. What is the value for $\left(\sum X\right)^2$?
    b. What is the value for $\sum X^2$?

    OTHER: Study Guide; New

24. Round the following to two decimal place accuracy.

    a. 75.0338
    b. 75.0372
    c. 75.0350
    d. 75.0450
    e. 75.045000001