Math 100
Practice
Problems Test #3
Fall 2022

1. Which of the following would be defined as categorical data?

    a. The number of votes to win an election.
    b. The colors of the shirts in your closet.
    c. The population of the countries in North America.
    d. The winning times of the 500m freestyle Olympic finals.

2. A survey was conducted to determine how many students work out at a gym during a semester at Radford University. A sample of 250 Radford University students from the spring semester of 2009 filled out the survey. 78% of the 250 students indicated that they had some form of exercise at a gym during the semester.
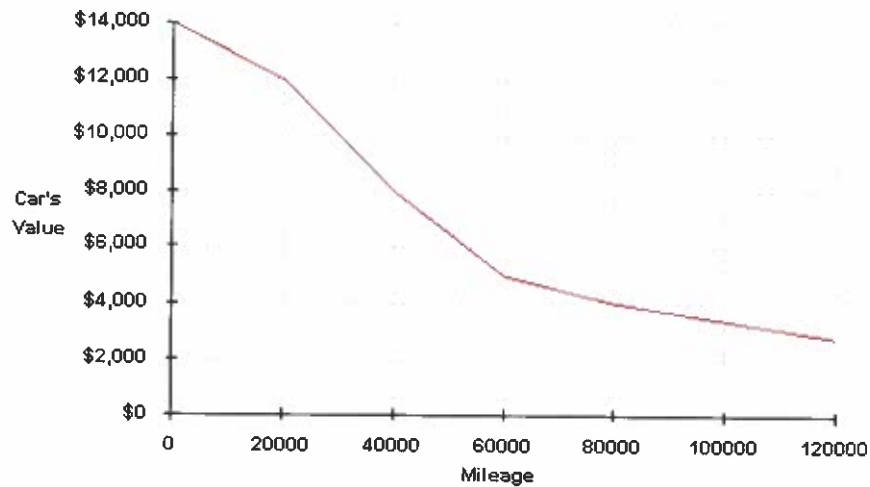
What is the population?

    a. 250 Radford University students.
    b. All Radford University students.
    c. 78% of the 250 Radford University students that took the survey.
    d. All Radford University students in the spring semester of 2009.

Given the graph below, answer questions 3-4.
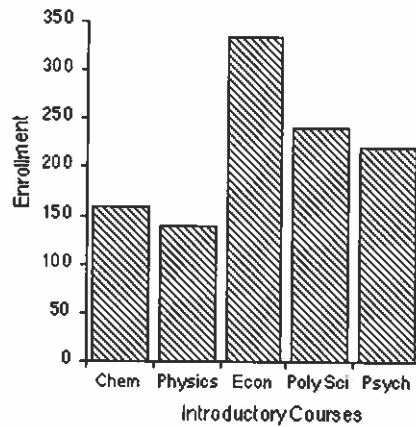
3. How many more students are enrolled in Econ classes versus Chem. classes?
   - a. about 300 more
   - b. about 200 more
   - c. about 100 more
   - d. about 50 more

4. Which two courses have approximately the same number of students enrolled in each?
   - a. Econ and Psych
   - b. Physics and Psych
   - c. Chem and Poly Sci
   - d. Poly Sci and Psych

Given the graph below, answer questions 5-6.

Car's Value (y-axis): $0, $2,000, $4,000, $6,000, $8,000, $10,000, $12,000, $14,000

Mileage (x-axis): 0, 20000, 40000, 60000, 80000, 100000, 120000

5. The value of the car at 20,000 miles is approximately:
   a. $5000
   b. $12,000
   c. $10,000
   d. $4000
   e. None of these

6. What would be an appropriate title for the given graph?
   a. Value of a car versus a car's age.
   b. Value of a car versus a car's mileage.
   c. Value of a car versus a car's color.
   d. Value of a car versus a car's driver.

Given the graph below, answer questions 7-8.

Expenditures for State and Local Governments

Public Welfare
14%

Highways
7%

Other
45%
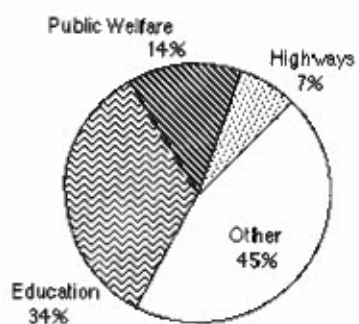
Education
34%

7. If the total spending is $150,000, how much money was spent on public welfare?

    a. $22,500   b. $21,000   c. $17,000   d. $27,000   e. None of these

8. Approximately how many times the amount of spending is spent on education versus highways?

    a. about 3 times   b. about 4 times   c. about 5 times   d. about 8 times

For Questions 9-13, use the information given below.

The following data was collected regarding the number of pounds that were lost by contestants participating in a game show.

3, 17, 10, 23, 45, 8, 16, 17, 16, 18, 120, 35, 34, 17

9. The sample mean of the data is:

    a. 27.1 pounds
    b. 30.2 pounds
    c. 25.9 pounds
    d. 22.5 pounds
    e. None of these

10. The sample median of the data is:

    a. 16 pounds
    b. 17 pounds
    c. 16.5 pounds
    d. 17.5 pounds
    e. 18 pounds

11. The sample mode of the data is:

    a. 16 pounds
    b. 17 pounds
    c. 18 pounds
    d. 16.5 pounds
    e. The data does not have a mode

12. Which of the following would be the most representative and fair measure of the central tendency of this particular set data?

    a. The mean because there are not outliers.
    b. The median because there is an outlier.
    c. The mode because the outlier occurs most often.
    d. All of these

13. For the contestant that lost 120 pounds, what is this data point referred to as in statistics?

    a. An anomaly
    b. An outlier
    c. A beefy piece of data

Use the following stem-leaf diagram to answer questions 14-16.

The tuition & fees for one semester at a sample of peer universities are found in the stem and leaf plot below.

Key 3|6 = $3600

```
1| 4 7
2| 5 5
3|1 6
4|7
5|2
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14. Calculate the mean of the data, to the nearest dollar.
    a. $2908
    b. $3490
    c. $3173.50
    d. $3087.50
    e. None of these

15. Calculate the mode of the data.
    a. $3173
    b. $2500
    c. $2800
    d. $2500
    e. None of these

16. Calculate the range of the data.
    a. $5200
    b. $1400
    c. $6600
    d. $3800

17. Which of the following choices would represent the spread of any data set?

    a. Range, Sample Variance, Standard Deviation
    b. Count, Sum, Median
    c. Mean, Median, Mode
    d. Minimum, Maximum, Midpoint

Answer questions 18-20 given the table below.

x_i	x_i^2	$x_i - \overline{x}$	$(x_i - \overline{x})^2$
3	9	-7.75	60.0625
6	36	-4.75	22.5625
9	81	-1.75	3.0625
25	625	14.25	203.0625

$\Sigma = 288.75$

18. The sample variance for the data from the table given above is:

    a. 96.25
    b. 9.81
    c. 4
    d. 10.75
    e. None of these

19. The standard deviation for the data from the table given above is:

    a. 96.25
    b. 9.81
    c. 4
    d. 10.75
    e. None of these

20. Subtracting 2 from each value in a data set would **not** change which of the following measures?

    a. The mean
    b. The mode
    c. The standard deviation
    d. The median
    e. All of the above would change

21. What is the standard deviation of the data set: 99, 99, 99, 99, 99?

    a. 23
    b. 1
    c. 0
    d. 10
    e. None of these

Answer questions 22-23 given the frequency table below.

Age	Frequency	Midpoint
0-10	57	5
10-20	68	15
20-30	36	25
30-40	71	35
40-50	44	45

22. What is the mean of the data?

    a. 24.2 years
    b. 68.0 years
    c. 25.0 years
    d. Not enough information

23. What is the mode of the data?

    a. 15 years
    b. 68 years
    c. 71 years
    d. 35 years

24. What is the range of the data?

    a. 50 years
    b. 40 years
    c. 30 years
    d. 25 years

25. Given the frequency table below, if you were to make a histogram, what shape would it be?

Weight at Birth (in pounds)	Frequency
2-3	44
3-4	30
4-5	16
5-6	5
6-7	2

  a. Skewed right
  b. Skewed left
  c. Uniform
  d. Bimodal
  e. Symmetrical

26. The following results were obtained when using the *pairwise comparison method* to elect a president. How many points does candidate C have?

Member 1: A < B, A = C, B < C
Member 2: A = B, A = C, C < B
Member 3: A = B, A > C, C > B

(a) 2.5 points
(b) 2 points
(c) 3.5 points
(d) 3 points
(e) None of the above

27. Tom, Alex, and Sam are the finalists for the most popular award at their high school. Tom received 123 votes, Alex received 112 votes. How many votes does Sam need in order to win the election using *majority rules method*?

  a. 235 votes
  b. 244 votes
  c. 124 votes
  d. 236 votes
  e. He cannot win the election using the majority rules method.

28. Which of the following describes the **Condorcet Criterion or Condercet Candidate** of social choice theory?

    (a) If candidate A wins a first election, and then some candidates are removed and a second election is held, then candidate A should win the election.

    (b) If a candidate is favored when compared one-on-one with every other candidate, then that candidate should win.

    (c) If a candidate receives a majority of the votes, that candidate should win.

    (d) A candidate who wins a first election and gains additional support (without losing any of his original support), the candidate should win a second election.

    (e) None of the above

The following results were obtained when voting for candidates A, B and C took place for a class election. Each voter was required to rank the candidates as recorded below. Answer questions 29-31 with the given information

	ABC	ACB	BAC	BCA	CAB	CBA
Number of Voters	6	1	4	10	2	6

29. If the **Borda Count method** is used, how many **points** does candidate C have?

    (a) 8 points
    (b) 9 points
    (c) 24 points
    (d) 27 points
    (e) None of the above

30. If the **majority rules method** is used, who wins the above election?

    (a) Candidate A wins
    (b) Candidate B wins
    (c) Candidate C wins
    (d) Nobody wins using the majority rules method.

31. If the *plurality method* is used, who wins the election?

    (a) Candidate A wins
    (b) Candidate B wins
    (c) Candidate C wins
   (d) Nobody wins the election using this method

32. If there are 5 candidates in an election and 10 voters. If the Borda count method is used, what is the maximum number of points a candidate could earn?

    (a) 50 points
    (b) 10 points
    (c) 5 points
    (d) 15 points
    (e) None of the above

33. Tom, Alex, and Sam are the finalists for the most popular award at their high school. Tom received 123 votes, Alex received 112 votes. How many votes does Sam need in order to wing the election using *Plurality method*?

    a. 235 votes
    b. 244 votes
    c. 124 votes
    d. 236 votes
    e. He cannot win the election using the majority rules method.

34. What type of histogram is given below.
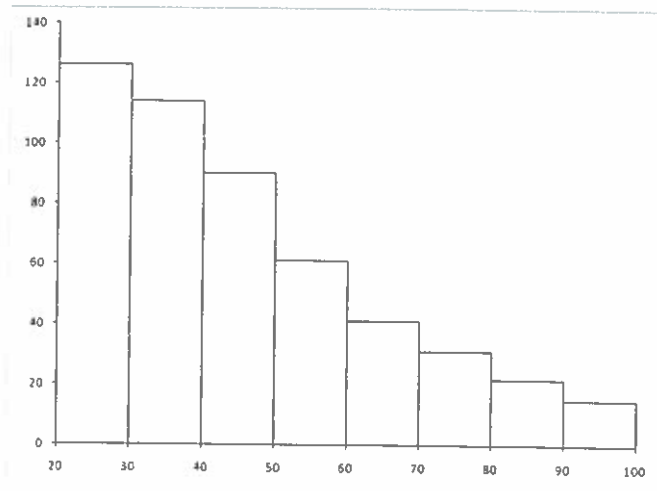
a) The histogram is uniform.
b) The histogram is skewed to the left.
c) The histogram is skewed to the right.
d) The histogram is symmetric.
e) None of these