

STATISTICS

PROBLEM 2: BASKETBALL STATISTICS

When you observe a basketball game, you are exposed to several types of numbers. Consider the table of team statistics for February 9, 1999.

Basketball Team Statistics

February 9, 1999

Name	Uniform Number	Points from Field Goals	Points from Free Throws	Total Points
Rachel H.	3	4	3	7
Joy	5	0	0	0
Niki	10	6	0	6
Tequila	11	0	0	0
Michelle	20	2	2	4
Angel	22	2	0	2
Shawna	24	0	0	0
Tarika	30	14	1	15
Rachel S.	32	18	0	18
Lachelle	33	10	0	10
Krystal	42	10	0	10

- A. Divide the basketball players into two groups - those young women who scored points and those that scored no points. Call the groups A and B. Is there any member of Group A that is also a member of Group B? Groups A and B are said to be mutually exclusive since no member of Group A is a member of Group B and vice versa.

The labels A and B are used only as names for these groups; these are considered *nominal level data*. Write a definition for nominal level data.

- B. Rank the players on this team by the number of points each scored. Assign each a number. For example, rank Rachel S. as number 1 because she was the highest scorer. Are these rankings (classes) mutually exclusive? Data of this nature are called *ordinal level data*. Write a definition of ordinal level data.

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- C. Eight team players scored points by making field goals. Make a list of the points scored from field goals. List duplicate values only once. Would it have been possible for a player to have scored 12 or 16 points? What is the interval between each class if 8, 12 and 16 are included? Is each class mutually exclusive?

Data of this nature are called *interval level data*. Write a definition of interval level data.

- D. Examine the table of basketball statistics from February 9, 1999. Give another example of nominal level data, ordinal level data, and interval level data. Explain your reasoning for each example.
- E. Calculate the descriptive statistics for each column of figures in the table.

Statistic	Uniform Number	Points from Field Goals	Points from Free Throws	Total Points
Mean				
Median				
Mode				
Range				
Lower Quartile				
Upper Quartile				
Interquartile Range				
Standard Deviation				

- F. Identify the data type for the variables Uniform Numbers; Points from Field Goals; Points from Free Throws; and Total Points Scores.
- G. If you were a basketball coach, would you want to calculate the measures of central tendency and variability for these four categories? Explain.

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ONE SOLUTION TO PROBLEM 2: BASKETBALL STATISTICS

A. Divide the basketball players into two groups - those young women who scored points and those that scored no points. Call the groups A and B. Is there any member of Group A that is also a member of Group B? Groups A and B are said to be mutually exclusive since no member of Group A is a member of Group B and vice versa.

The labels A and B are used only as names for these groups; these are considered *nominal level data*. Write a definition for nominal level data.

The groups should be divided as follows. Notice that no player is (or can be) a member of both groups.

<u>Group A</u>	<u>Group B</u>
Rachel H.	Joy
Niki	Tequila
Michelle	Shawna
Angel	
Tarika	
Rachel S.	
Lachelle	
Krystal	

Nominal level data are used only to assign a name or category to a data point. Levels of nominal data are mutually exclusive.

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B. Rank the players on this team by the number of points each scored. Assign each a number. For example, rank Rachel S. as number 1 because she was the highest scorer. Are these rankings (classes) mutually exclusive? Data of this nature are called *ordinal level data*. Write a definition of *ordinal level data*.

For our example,

1. Highest scorer: Rachel S.
2. Second highest scorer: Tarika
3. Third highest scorer: Lachelle, Krystal
4. Fourth highest scorer: Rachel H.
5. Fifth highest scorer: Niki
6. Sixth highest scorer: Michelle
7. Seventh highest scorer: Angel.
8. Eighth highest scorer: Joy, Tequila, Shawna

The classes are mutually exclusive, even though there may be more than one person in each class.

Ordinal variables can be sorted into ranks. The classes of ordinal data are mutually exclusive.

C. Eight team players scored points by making field goals. Make a list of the points scored from field goals. List duplicate values only once. Would it have been possible for a player to have scored 12 or 16 points? What is the interval between each class if 8, 12 and 16 are included? Is each class mutually exclusive?

Data of this nature are called *interval level data*. Write a definition of *interval level data*.

The points scored from field goals were $\{2, 4, 6, 10, 14, 18\}$. Although no mention of 2 and 3-point goals was made, in any case, players could certainly have scored 8, 12 or 16 points. If 8, 12 and 16 are included, the interval between each class is 2. Also, note that each class is mutually exclusive.

Interval data are usually numerical. We can readily calculate the difference between any two values.

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D. Examine the table of basketball statistics from February 9, 1999. Give another example of nominal level data, ordinal level data, and interval level data.

Explain your reasoning for each example.

Possible answers include the following.

Nominal Level: Uniform Numbers

Ordinal Level: Ranking by Total Number of Points Scored, Ranking by Points from Free Throws.

Interval Level: Points from Free Throws, Total Number of Points

E. Calculate the descriptive statistics for each column of figures in the table.

Select "Statistics" from the MAIN MENU. Then,

- x Clear existing data from the lists by pressing $\boxed{F6}$, $\boxed{F4}$, and $\boxed{F1}$ when the list you want is highlighted.
- x Enter the Uniform Numbers into List 1, Points from Field Goals into List 2, Points from Free Throws into List 3, and Total Points into List 4.
Press \boxed{EXE} after each entry.

To calculate the descriptive statistics for each data set,

- x Press $\boxed{F2}$ $\boxed{F6}$ to set up the calculations. Select the appropriate list for the 1Var Xlist field. Make sure the 1Var Freq is 1.
- x Press \boxed{EXIT} to return to the lists.
- x Press $\boxed{F1}$ for the one-variable statistics.

Repeat this process for each of the lists. Results are shown in the following table.

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Statistic	Uniform Number	Points from Field Goals	Points from Free Throws	Total Points
Mean	21.09	6	0.54	6.55
Median	22	4	0	6
Mode	No mode	0	0	0
Range	$42 - 3 = 39$	$18 - 0 = 18$	$3 - 0 = 3$	$18 - 0 = 18$
Lower Quartile	10	0	0	0
Upper Quartile	32	10	1	10
Interquartile Range	$32 - 10 = 22$	$10 - 0 = 10$	$1 - 0 = 1$	$10 - 0 = 10$
Standard Deviation	12.64	6.20	1.04	6.19

F. Identify the data type for the variables Uniform Numbers; Points from Field Goals; Points from Free Throws; and Total Points Scored.

Uniform Numbers: Nominal Data

Points from Field Goals: Interval Data

Points from Free Throws: Interval Data

Total Points Scores: Interval Data

G. If you were a basketball coach, would you want to calculate the measures of central tendency and variability for these four categories? Explain.

Only the mode is meaningful for nominal data, and only the mode and median are meaningful for ordinal data. If we are interested in all of the measures, then we need interval variables. Therefore only the statistics for the Points from Field Goals, Points from Free Throws, and Total Points should be calculated.