2.2: Frequency Tables

A table will have columns and rows. Columns go up and down (think of pillars or Greek columns), and rows go left to right on the horizon line.

A graph (also called a chart) is like a drawing in which the data is plotted on two axes. These will be discussed next.

Table 2.2.1 shows the same data as Table 2.1.1 (scores on a 100-point final exam from one class from an unknown college provided by OpenIntro.org). The only difference is that they are all in one column in Table 2.2.1, which is typically how lists of raw data is provided.

Table 2.2.1- Final Exam Scores

Final Exam Scores
79
83
57
82
94
83
72
74
73
71
66
89
78
81
78
81
88
69
77
79

Let's practice with what we learned from the prior chapter on this new set of data.

Example 2.2.1

1. Who was the sample?
2. Who could this sample represent (population)?
3. What was measured?
4. How many students scored above 90 points on the exam?

Solution

1. 20 students from an unknown college
2. Anything reasonable; maybe students in college?
3. Scores on a 100-point final exam

4. One

It's difficult to answer that last question with the raw data shown in Table 2.2.1. It would be easier if the data was organized from highest score to lowest score, but an even easier way to answer these kinds of "how many" questions is to create a frequency table.

Definition: Frequency Table

Table showing each score in the "x" column, and how many people earned that score in the "f" column. The "x" stands in for whatever the score is, and the "f" stands for frequency.

Table 2.2.2 shows the same data as Table 2.2.1, but in a Frequency Table generated by software (Software Package for the Social Sciences, or SPSS). As you can see in Table 2.2.2, only one person scored each amount listed, except for the scores of 78, 79, 81, and 83 points (in which two students earned those scores).

Table 2.2.2- Frequency Table of Final Exam Scores

x	f
57.00	1
66.00	1
69.00	1
71.00	1
72.00	1
73.00	1
74.00	1
77.00	1
78.00	2
79.00	2
81.00	2
82.00	1
83.00	2
88.00	1
89.00	1
94.00	1
Total	20

You might notice that the Table 2.2.2 does not include final exam scores that no student earned (for example, no scores are in the "x" column between 57 to 66 points). You can include all of the scores with a frequency ("f" column) of zero, it does make the table much complicated to interpret. What can be confusing is frequency tables must include scores of zeros ("x" is the score, not the frequency or number of people who earned that score). For example, if a student skipped the final exam, then their zero points earned would need to be included in the "x" column, with a frequency ("f" column) of one student.

The following practice Exercise should be much easier with Table 2.2.2!

Exercise 2.2.1

1. How many students scored above 90 points on the exam?
2. How many students scored below 70 points?

Answer

1. One
2. Three

Did you notice that the x-variable, the final exam scores, was a quantitative variable (ratio scale of measurement)? Frequency Tables can also be used with qualitative variables (nominal scale of measurement). Table 2.2.3 shows the frequency ("f" column) of Associate of Arts for Transfer degrees (which are slightly different from Associate of Arts degrees in general) earned by California community college students in academic year 2019-2020 ("x" column). This data can be found on the California Community Colleges Chancellor's Office DataMart.

Table 2.2.3- AA-T Majors

x	f
Biological Sciences	19
Education	8
Family and Consumer Sciences	616
Fine and Applied Arts	2,778
Foreign Language	717
Health	1,982
Humanities (Letters)	6,667
Interdisciplinary Studies	1,034
Law	36
Media and Communications	444
Psychology	10,843
Public and Protective Services	33
Social Sciences	13,164

The majors in Table 2.2.3 are listed alphabetically, which makes understanding the numbers a little more confusing. Because qualitative variables have no natural order, you can list them however you like. To find your own major, an alphabetical order works best. But if you'd like emphasize which major has the most graduates, then order from the highest to the lowest number of graduates would be best. As we will learn more with charts, the best way to display data depends on what message you are trying to tell.

Most of the graphs shown in the rest of the chapter are derived from frequency tables, so I hope that you find some simple data and practice making a few before we starting using them more!

Contributors and Attributions

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