**Activity 7.5.2 Calculations of Marginal, Joint, and Conditional Percentages**

A Gallup Poll surveyed 1015 U.S. adults. One of the questions on the survey was:

Do you feel that the distribution of money and wealth in this country today is fair, or do you feel that the money and wealth in this country should be more evenly distributed among a larger percentage of the people? The choices were “Fair,” “Should be more even, and “Unsure.”

In addition, participants were asked to check off their political preference. Their choices were Democrat, Independent, or Republican.

Table 1 organizes the survey results into a two-way frequency table. The row variable is political preference response and the column variable is wealth distribution response.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency | Fair | Should be more even | Unsure | Total |
| Democrat | 56 | 402 | 9 | 467 |
| Independent | 65 | 124 | 14 | 203 |
| Republican | 197 | 117 | 31 | 345 |
| Total | 318 | 643 | 54 | 1015 |

Table 1. Data from Gallup poll of 1015 U.S. adults.

***Calculation of marginal relative frequencies and percentages***

There are two sets of marginal relative frequencies/percentages, one for political preference and the other for wealth distribution. To calculate a marginal relative frequency, divide an entry in the total column by the grand total:

 Marginal relative frequency = 

To convert to a percentage, multiply the relative frequency by 100 and add a percent symbol (%).

 Marginal percentage = 

For this activity, round all percentages to one decimal place.

1. Calculate the marginal relative frequencies and percentages for wealth distribution. Enter your results in Table 2. We have entered the relative frequency and percentage for Fair so that you can check your calculations. In addition, we have completed the total column. Check that your relative frequencies sum to 1 and your percentages sum to 100%.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Fair | Should be more even | Unsure | Total |
| Relative FrequencyPercent | 318/1015 31.3 |  |  | 1100 |

Table 2. Marginal relative frequencies and percentages for wealth distribution.

2. Calculate the marginal relative frequencies and percentages for political preference. Enter your results in Table 3. We have entered the relative frequency and percentage for Democrat so that you can check your calculations. In addition, we have completed the total column. Check that your relative frequencies sum to 1 and your percentages sum to 100%.

|  |  |  |
| --- | --- | --- |
|  | Relative Frequency | Percent |
| Democrat | 467/1015 | 46.0 |
| Independent |  |  |
| Republican |  |  |
| Total | 1 | 100 |

Table 3. Marginal relative frequencies and percentages for political preference.

***Calculation of joint relative frequencies and percentages***

There is one set of joint relative frequencies or percentages. For each possible response to the two questions, there is one relative frequency and corresponding percentage. So, the number of relative frequencies/percentages is equal to the size of the sample space for all possible responses to the two questions. (That turns out to be 3 × 3 or 9 in the case of Table 1.) To calculate a joint relative frequency, divide a cell entry (white cells) by the grand total:

 Joint relative frequency = 

To convert to a percentage, multiply the relative frequency by 100 and add a percent symbol (%).

 Joint percentage = 

3. Calculate the joint relative frequencies and percentages for political preference and wealth distribution. Enter your results in Table 4. We have entered the relative frequency and percentage for “Democrat and Fair” so that you can check your calculations. In addition, we have completed some entries in the total column. Check that the sum of the nine joint relative frequencies sum to 1 and that the nine percentages sum to 100% as indicated in the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Relative Frequency/ Percent | Fair | Should be more even | Unsure | Total |
| Democrat | 56/10155.5% |  |  | 0.4646% |
| Independent |  |  |  |  |
| Republican |  |  |  |  |
| Total | 0.31331.3% | 0.63363.3% | 0.0545.4% | 1100% |

Table 4. Joint relative frequencies and percentages for political preference and wealth distribution.

***Calculation of conditional relative frequencies and percentages***

There are two sets of conditional relative frequencies or percentages. We begin with the relative frequency of wealth distribution (column variable) for each level of political preference (row variable). This is a row relative frequency or percentage. To calculate a row relative frequency, divide a cell entry (white cells) by the row total:

 Row relative frequency = 

To convert to a percentage, multiply the relative frequency by 100 and add a percent symbol (%).

 Row relative percentage = 

4. Calculate the row relative frequencies and percentages. Enter your results in Table 5. We have entered the relative frequency and percentage for Fair conditioned on the political preference being Independent so that you can check your calculations. Check that the sum of the relative frequencies in each row is 1 and the percentages in each row is 100%

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Relative Frequency/ Percent | Fair | Should be more even | Unsure | Total |
| Democrat |  |  |  |  |
| Independent | 65/20332.0% |  |  | 1100% |
| Republican |  |  |  |  |

Table 5. Row relative frequencies and percentages.

5. Calculate the column relative frequencies and percentages. Enter your results in Table 6. We have entered the relative frequency and percentage for Democrat conditioned on the wealth distribution responses of Unsure. Check that the sum of the relative frequencies in each column is 1 and the percentages in each column sum to 100%.

|  |  |  |  |
| --- | --- | --- | --- |
| Relative Frequency/ Percent | Fair | Should be more even | Unsure |
| Democrat |  |  | 9/5416.7 |
| Independent |  |  |  |
| Republican |  |  |  |
| Total |  |  | 1100 |

Table 6. Column relative frequencies and percentages.