**A.P. Statistics - Marginal and Conditional distributions. (Solutions)**

Following are statistics from exit polls from the 2004 presidential election.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Bush** | **Kerry** | **Total** |
| **White Men** | 3049 | 1820 | 4869 |
| **White Women** | 3080 | 2464 | 5544 |
| **Non White Men** | 410 | 915 | 1325 |
| **Non-White Women** | 393 | 1229 | 1622 |
| **Total** | 6932 | 6428 | 13360 |

1. Fill in the margins with the totals.

How many people were polled? **13,360**

1. What percent of white women voted for Kerry? **41.5%**
2. What percent of men voted for Bush? **46.4%**
3. Complete the chart to determine the marginal distribution of votes for each candidate in terms of percent.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Bush | Kerry |  |  |
|  |  | 51.9% | 48.1% |  |  |
| 3. | Complete the chart to find the marginal distribution of gender in terms of percent. | | | |  |
|  |  |  |  |  |  |
|  |  | Male | Female |  |
|  |  | 45.3% | 54.7% |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4. Complete the chart to find the conditional distribution of gender categories among Bush voters. | | | | | | | | | | | | | | | | | | | | |  | |
|  | |  | |  | |  | |  |  | | | |  | |  | |  | |  | |  | |
|  | | **White Men** | | | |  | | **White Women** | | | | | | | **Non-white Men** | | | | **Non-white Women** | |  | |
|  | | 44.0 % | | | |  | | 44.4% | | |  | |  | | 5.9% | |  | | 4.9% | |  | |
|  | |  | |  | |  | | |  | |  | |  | |  | |  | |  | |  | |
|  | |  | |  | | **Bush** | | |  | | **Kerry** | |  | | **Total** | |  | |  | |
| **No High School** | | | |  | | 268 | | |  | | 273 | |  | | 541 | |  | |  | |  | |
| **HS Grad** | | | |  | | 1563 | | |  | | 1412 | |  | | 2975 | |  | |  | |  | |
| **Some college** | | | |  | | 2360 | | |  | | 2011 | |  | | 4371 | |  | |  | |  | |
| **College Grad** | | | |  | | 1847 | | |  | | 1634 | |  | | 3481 | |  | |  | |  | |
| **Post Grad** | | | |  | | 962 | | |  | | 1202 | |  | | 2164 | |  | |  | |  | |
| **Total** | | | |  | | 7000 | | |  | | 6532 | |  | | 13532 | |  | |  | |  | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5. | Find the margins with the totals. | | | |  |  |  |  |  |  |  |  |  |
| 6. | Complete the chart to find the marginal distribution of education in terms of percent. | | | | | | | | |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **No HS** | **HS Grad** | **Some college** |  | **College grad** | |  | **Post grad** |  |  |  |  |
|  |  | 4.0% | 22.0% | 32.3% |  | 25.7% |  |  | 16.0% |  |  |  |  |
| 7. | Complete the chart to find the conditional distribution of education among both Bush and Kerry voters. | | | | | | | | | | | |  |
|  |  |  |  |  |  | |  |  | |  | |  |  |
|  |  |  | **No HS** | **HS Grad** | **Some college** | |  | **College grad** | | **Post grad** | |  |
|  |  | Bush | 3.8% | 22.3% | 33.7% | |  | 26.4% | | 13.7% | |  |  |
|  |  | Kerry | 4.2% | 21.6% | 30.8% | |  | 25.0% | | 18.4% | |  |  |

8. Illustrate # 7 in a back to back bar chart.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Bush** | **Kerry** | **Total** |
| **White Men** | 3049 | 1820 | 4869 |
| **White Women** | 3080 | 2464 | 5544 |
| **Non White Men** | 410 | 915 | 1325 |
| **Non-White Women** | 393 | 1229 | 1622 |
| **Total** | 6932 | 6428 | 13360 |
|  | **Bush** | **Kerry** | **Total** |

1. Fill in the margins with the totals.
2. What percent of voters were white, African-American, Latino, Asian, and other. Compare this with the data for 2000 on <http://www.infoplease.com/ipa/A0762156.html>. Did the pollsters interview a representative population?
3. Complete the chart to find the conditional distribution of race among both Bush and Kerry voters.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **White** | **Af-Amer** | **Latino** | **Asian** | **Other** |
| Bush | 87.5% | 2.4% | 6.9% | 1.7% | 1.6% |
| Kerry | 66.2% | 20.3% | 8.9% | 2.3% | 2.3% |

1. Illustrate # 11 in a back to back bar chart.
2. Write a paragraph describing you findings based on the previous data. Be sure to address marginal as well as conditional distributions.

14. Here are some statistics of the students at Wissahickon High School and their involvement in AP Courses.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Freshmen | Sophs | Juniors | Seniors |  |
| No AP Courses | | 311 | 296 | 277 | 133 | 1017 |
| 1 | AP Course | 1 | 23 | 65 | 51 | 140 |
| 2 | AP Courses | 0 | 4 | 48 | 83 | 135 |
| 3 or More AP Courses | | 0 | 0 | 4 | 54 | 58 |
|  |  | 312 | 323 | 394 | 321 | 1350 |

a.

b. Give the marginal distribution of class in terms of percents.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Freshmen** | **Sophs** | **Juniors** |  | **Seniors** |
|  | 23.1% | 23.9% | 29.2% |  | 23.8% |
| c. Give the marginal distribution of AP status in terms of percents: | | | | |  |
|  |  |  |  | |  |
|  | **No AP** | **1 AP** | **2 AP** |  | **3 AP** |
|  | 75.3% | 10.4% | 10.0% |  | 4.3% |
| d. Find the conditional distribution of AP status among seniors in percents. | | | | | |
|  |  |  |  | |  |
|  | **No AP** | **1 AP** | **2 AP** |  | **3 AP** |
|  | 41.4% | 15.9% | 25.9% |  | 16.8% |



e. Find the conditional distribution among classes among students taking no AP Courses.

|  |  |  |  |
| --- | --- | --- | --- |
| **Freshmen** | **Sophs** | **Juniors** | **Seniors** |
| 30.6% | 29.1% | 27.2% | 13.1% |

1. Draw a bar chart expressing the distribution (in percents) of students taking various numbers of AP Courses.
2. Write a sentence describing the information you get from the bar chart **in context**.

15. Here are some statistics for students of driving age in Montgomery County based on whether or not their parents work.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student drives | Student doesn't | **Total** |
|  | to school | drive to school |  |
|  |  |  |  |
| Both parents work | 3,142 | 4,230 | **7,372** |
| One parent works | 2,104 | 1,648 | **3,752** |
| Neither parent works | 425 | 118 | **543** |
| **Total** | **5,671** | **5,996** | **11,667** |

a. Fill in the totals in the chart above.

b. Give the marginal distribution of student driving habits in terms of percentages:

|  |  |
| --- | --- |
| Student Drives | Student Doesn’t Drive |
| 48.6% | 51.4% |

c. Give the marginal distribution of parents working status in terms of percentages:

|  |  |  |
| --- | --- | --- |
| Both Parents Work | One Parent Works | Neither Parent Works |
| 62.6% | 31.9% | 4.6% |

d. Give the conditional distribution of driving habits among students whose both parents work in percents.

|  |  |
| --- | --- |
| Student Drives | Student Doesn’t Drive |
| 42.6% | 57.4% |

e. Give the conditional distribution of parent work status among students who drive to school.

|  |  |  |
| --- | --- | --- |
| Both Parents Work | One Parent Works | Neither Parent Works |
| 55.4% | 37.1% | 7.5% |