Homework №6

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6.1 (a) It describes $736 + 450 + 193 + 205 + 144 + 80 = 1808$ people.
Of 1808 people, $736 + 450 + 193 = 1379$ played video games.

(b) As and Bs would be $\frac{736 + 205}{1808} \approx 0.5204$ which is 52.04%.

Cs would be $\frac{450 + 144}{1808} \approx 0.3285$ which is 32.85%.

Ds and Fs would be $\frac{193 + 80}{1808} \approx 0.1509$ which is 15.09%.

6.3 From the exercise 6.1, we know that there are 1379 players in total. Then we have:

$\frac{736}{1379} \approx 0.5337$ which is 53.37% got As or Bs.

$\frac{450}{1379} \approx 0.3263$ which is 32.63% got Cs.

$\frac{193}{1379} \approx 0.1399$ which is 13.99%got Ds and Fs.

6.5 We just have to solve a system of linear equations shown below.

$$\begin{cases} a + b = 50 \\ c + d = 50 \\ a + c = 60 \\ b + d = 40 \end{cases}$$

Let's pick $a = 20$. Then from the first equation, we get $b = 50 - 20 = 30$. From the third equation, we get $c = 60 - a = 60 - 20 = 40$. And from the fourth equation, we get $d = 40 - b = 40 - 30 = 10$. At last, we got the solution which is a four-tuple $(a = 20, b = 30, c = 40, d = 10)$.

We can now pick a different value for a. Say $a = 50$. Then From the first equation, we get $b = 50 - 50 = 0$. From the third equation, we get $c = 60 - a = 60 - 50 = 10$. And from the fourth equation we get $d = 40 - b = 40 - 0 = 40$. In this case, our solution is a different four-tuple which is $(a = 50, b = 0, c = 10, d = 40)$

At last, we indeed have gotten two different sets which are $a = 20, b = 30, c = 40, d = 10$ and $a = 50, b = 0, c = 10, d = 40$.

6.6 (a) Alex Brailsford made $\dfrac{15+5}{15+15+5+15} \times 100\% = \dfrac{20}{50} \times 100\% = 40\%$ of all field goals.

Rickie Jackson made $\dfrac{30+65}{30+29+65+130} \times 100\% = \dfrac{95}{254} \times 100\% \approx 37.4\%$ of all field goals.

(b) Alex Brailsford made $\dfrac{15}{15+15} \times 100\% = \dfrac{15}{30} \times 100\% = 50\%$ of all two-point field goals.

Alex Brailsford made $\dfrac{5}{5+15} \times 100\% = \dfrac{5}{20} \times 100\% = 25\%$ of all two-point field goals.

Rickie Jackson made $\dfrac{30}{30+29} \times 100\% = \dfrac{30}{59} \times 100\% \approx 50.8\%$ of all two-point field goals.

Rickie Jackson made $\dfrac{65}{65+130} \times 100\% = \dfrac{65}{195} \times 100\% \approx 33.3\%$ of all two-point field goals.

(c) This is due to Simpson's paradox which implies that am association or comparison that holds for all several groups can <u>reverse</u> direction when the data are combined to form a single group.

20. **<u>Marital Status</u>**

There would be $\dfrac{4938}{39648} \times 100\% \approx 12.45\%$ for singles.

There would be $\dfrac{28132}{39648} \times 100\% \approx 70.95\%$ for married.

There would be $\dfrac{5923}{39648} \times 100\% \approx 14.93\%$ for divorced.

There would be $\dfrac{655}{39648} \times 100\% \approx 1.65\%$ for widowed.

The percentages add up to 99.98% and not to 100% due to the roundoff errors.

<u>Income</u>

There would be $\dfrac{1918}{39648} \times 100\% \approx 4.83\%$ for singles.

There would be $\dfrac{20932}{39648} \times 100\% \approx 52.79\%$ for married.

There would be $\dfrac{10750}{39648} \times 100\% \approx 27.11\%$ for divorced.

There would be $\dfrac{6048}{39648} \times 100\% \approx 15.25\%$ for widowed.

The percentages add up to 99.98% and not to 100% due to the roundoff errors.

6.21 Percent of single men with no income is $\dfrac{513}{4938} \times 100\% \approx 10.39\%$.

Percent of men with no income that are single is $\dfrac{513}{1918} \times 100\% \approx 26.75\%$.

6.22 $\dfrac{513}{4938} \times 100\% \approx 10.39\%$ for men with no income.

$\dfrac{3323}{4938} \times 100\% \approx 67.29\%$ for men with income in range $\$1 - \$49,999$.

$\dfrac{814}{4938} \times 100\% \approx 16.48\%$ for men with income in range $\$50,000 - \%99,999$.

$\dfrac{288}{4938} \times 100\% \approx 5.83\%$ for men with income $\%100,000$ and over.

$10.39 + 67.29 + 16.48 + 5.83 = 99.9\%$ and therefore, the percents do add up to 100% (up to roundoff error).

6.26 We must come up with two two-way tables of obese by early death for smokers and non-smokers.

	Obese	Non-obese
Early death	134	274
Non-early-death	35	47
Smokers	Obese	Non-obese
Early death	112	162
Non-early-death	22	26
Non-smokers	Obese	Non-obese
Early death	22	112
Non-early-death	13	21

6.30 We have to calculate the percent of each type of complication for each disease.

Gastric banding

$\frac{81}{5380} \times 100\% \approx 1.51\%$ is non-life-threatening.
$\frac{46}{5380} \times 100\% \approx 0.86\%$ is serious.
$\frac{5253}{5380} \times 100\% \approx 97.64\%$ is none.

Sleeve gastrectomy

$\frac{31}{854} \times 100\% \approx 3.63\%$ is non-life-threatening.
$\frac{19}{854} \times 100\% \approx 2.22\%$ is serious.
$\frac{804}{854} \times 100\% \approx 94.15\%$ is none.

Gastric bypass

$\frac{606}{9041} \times 100\% \approx 6.70\%$ is non-life-threatening.
$\frac{325}{854} \times 100\% \approx 3.59\%$ is serious.
$\frac{8110}{854} \times 100\% \approx 89.70\%$ is none.

Then from this data, it is easy to see that **gastric bypass** leads to the most complications and **gastric banding** to the least complications with **sleeve gastrectomy** being somewhere in-between in terms of complications.