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Mat-258

Lab 3: Goodness of fit.

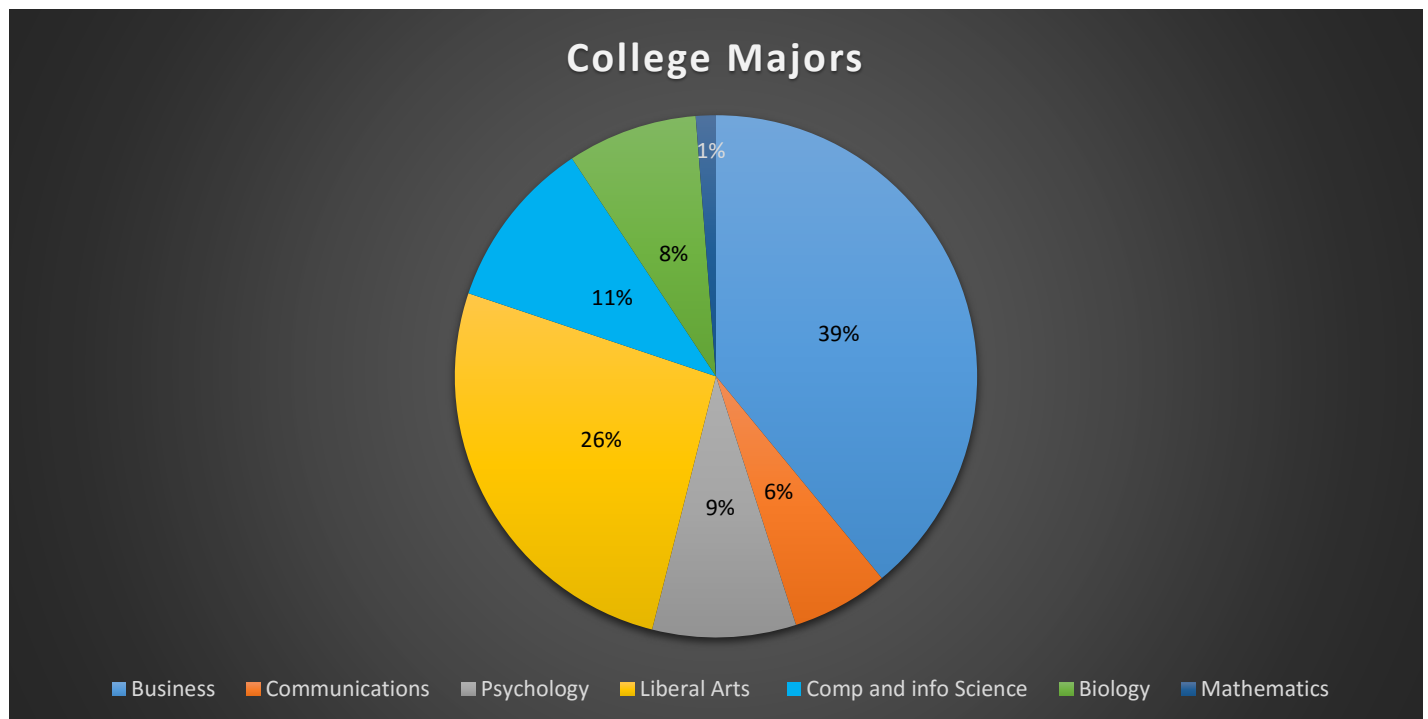
In this lab, we're going to look at data that is a subset of NCES's "Digest of Education Statistics" for the year of 2014. The data (summarized) below describes several majors offered throughout the United States and the amount of students enrolled in them. I chose this topic of research because I was interested to see what the distribution of majors around the nation is. I thought it'd help highlight if there are and which are the most popular majors for students in post-secondary educational institutions around the country.

Here is a summary of a subset of the total data we'll be analyzing. As you can see by the table; there are a total of 6 majors to be looked at. The sample size of students with these such majors is 6588000.

College Majors
(Totals in thousands)

Business	Communications	Psychology	Liberal Arts and Humanities	Computer and Info Sciences	Biology	Mathematics
3,487	535	794	2,341	942	719	111

Presented below is a graph summarizing the data shown in the table.



Now that we've taken a glance at the data; we must seek the answer to the main question of concern for this lab. Are the proportion of students in these majors across the country evenly distributed? Observe below.

Solution

H_0 : The proportions are evenly distributed.

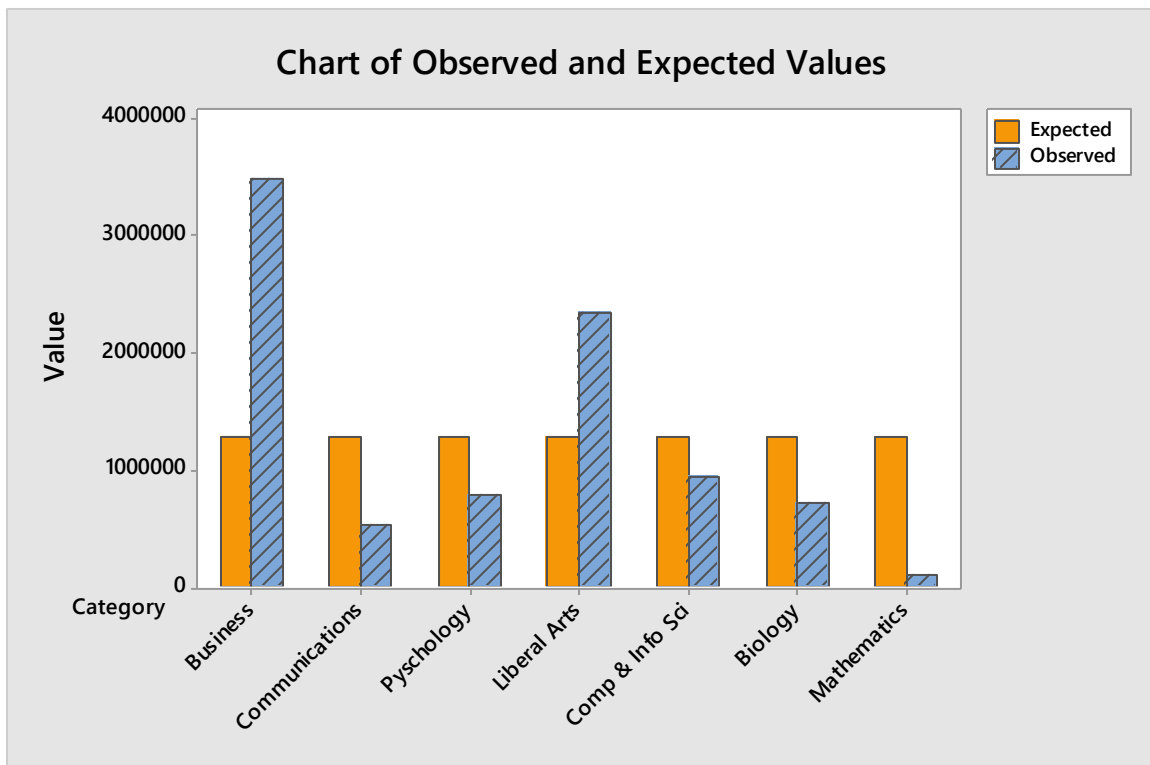
H_a : The proportions are not evenly distributed.

$N = 8,929,000$.

Degrees of Freedom = $6 - 1 = 5$.

Category	Observed	Test Proportion	Expected	Contribution to Chi-Sq
Business	3487000	0.166667	1098000	5197924
Communications	535000	0.166667	1098000	288679
Liberal Arts	794000	0.166667	1098000	84168
Computer & Info Sci	942000	0.166667	1098000	22164
Biology	719000	0.166667	1098000	130821
Mathematics	111000	0.166667	1098000	887221

N	DF	Chi-Sq	P-Value
6588000	5	6610976	0.000



According to the results displayed above; we have a P-value that is far less than our standard significance level of 0.05. Therefore, we reject our null hypothesis. We can conclude that no, the proportion of students in the six majors chosen above are definitely not evenly distributed. Some of the majors hold a far greater population than the others. There are however a few lurking variables that can be altering the results of this experiment. For example, there are far more than six majors offered throughout the nation. The fact that we only looked at 6 of them could be having unintended side effects.