

STAT 110: Practice Problem 15

Fall 2017

1. A European manufacturer of automobiles claims that their cars are preferred by the younger generation and would like to target university students in their next ad campaign. Suppose we test their claim with our own survey. Random samples of autos parked in the student lot and the staff lot at a large university classified the brands by country of origin, as seen in the following table.

	Student	Staff
American	107	105
European	33	12
Asian	55	47

Research Question: Are there differences in the national origins of cars driven by students and staff?

- Use JMP to create a mosaic plot for these data, and describe the differences you see between student and staff preferences in this sample.
- Convert the research question into a null and alternative hypothesis.
- Calculate the expected counts “by hand” and then find the chi-square test statistic “by hand.”
- Use JMP to verify the test statistic and to find p-value from these data.
- Write a conclusion in the context of the problem.

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2. The following table shows the rank attained by male and female officers in the police department of a large U.S. city.

	Male	Female
Officer	21,900	4281
Detective	4058	806
Sergeant	3989	415
Lieutenant	1333	89
Captain	359	12
Higher ranks	218	10

Research Question: Do these data indicate that men and women are unequally represented at some levels of the department in this city?

- Use JMP to create a mosaic plot for these data, and describe the differences you see between males and females in this sample.
- Convert the research question into a null and alternative hypothesis.
- Calculate the expected counts “by hand” and then find the test statistic “by hand.”
- Use JMP to verify the test statistic and to find p-value from these data.
- Write a conclusion in the context of the problem.