Lab 19: Section 15.1 Chi-Square Tests for Univariate Categorical Data
Section 15.2 Tests for Homogeneity and Independence in a Two-Way Table

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1. A bank has an ATM installed inside the bank, and it is available to its customers only from 7 AM to 6 PM Monday through Friday. The manager of the bank wanted to investigate if the number of transactions made on this ATM are the same for each of the 5 days (Monday through Friday) of the week. She randomly selected one week and counted the number of transactions made on this ATM on each of the 5 days during this week. The information she obtained is given in the following table, where the number of users represents the number of transactions on this ATM on these days. For convenience, we will refer to these transactions as "people" or "users."

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Number of Users	253	197	204	279	267

   At the 1% level of significance, can we reject the null hypothesis that the number of people who use this ATM each of the 5 days of the week is the same? Assume that this week is typical of all weeks in regard to the use of this ATM.

2. Henderson Corporation makes metal sheets, among other products. When the process that is used to make metal sheets works properly, 92% of the metal sheets contain no defects, 5% have one defect each, and 3% have two or more defects each. The quality control inspectors at the company take samples of metal sheets quite often and check them for defects. If the distribution of defects for a sample is significantly different from the above-mentioned percentage distribution, the process is stopped and adjusted. A recent sample of 300 sheets produced the frequency distribution of defects listed in the following table.

Number of Defects	None	One	Two or more
Number of Metal Sheets	262	24	14

   Does the evidence from this sample suggest that the process needs an adjustment? Use $\alpha = 0.01$.

3. Violence and lack of discipline have become major problems in schools in the United States. A random sample of 300 adults was selected, and these adults were asked if they favor giving more freedom to schoolteachers to punish students for violence and lack of discipline. The two-way classification of the responses of these adults is presented in the following table.

	In Favor (F)	Against (A)	No Opinion (N)
Men (M)	93	70	12
Women (W)	87	32	6

   Calculate the expected frequencies for this table, assuming that the two attributes, gender and opinions on the issue, are independent.

   (a) Calculate the expected frequencies for this table, assuming that the two attributes, gender and opinions on the issue, are independent.

   (b) Does the sample provide sufficient evidence to conclude that the two attributes, gender and opinions of adults, are dependent? Use a 1% significance level.