Math 58B, Spring 2022
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WU # 15
Tuesday, March 22, 2022

Your Name: _____

Names of people you worked with: _____

Instructions: Work on this problem in class with your group. Do your best. This piece of paper will be collected during class.

Task: Consider a setting where we are interested in comparing the soda preference across three of the Claremont Colleges. [Ask yourself what the observational units and variables are for the study below!] The following incomplete table describes the soda preferences for a sample of Pomona, Pitzer, and CMC students.

	Soda Preference			
College	Pepsi	Root beer	Sprite	Total
CMC				36
Pitzer				24
Pomona				60
Total	40	60	20	120

1. Fill in the table as if College and Soda Preference are independent variables. Note that half of the students prefer root beer. So, how many of the Pitzer students would you expect to prefer root beer?

   You are calculating the value of the data that you would **expect** under the null hypothesis.

2. Let's say the actual data was given by the following table. Create a new 3x3 table where each entry represents the difference (i.e., subtraction) between the observed value and the expected value (expected value is given in #1).

College	Soda Preference Pepsi	Root beer	Sprite	Total
CMC	10	17	9	36
Pitzer	6	16	2	24
Pomona	24	27	9	60
Total	40	60	20	120

3. Fill out the full 3x3 table one last time with each of the 9 entries as:

$$\frac{(Observed - Expected)^2}{Expected}.$$

Solution:

1. *Expected*

College	Soda Pepsi	Preference Root beer	Sprite	Total
CMC	12	18	6	36
Pitzer	8	12	4	24
Pomona	20	30	10	60
Total	40	60	20	120

2. $Observed - Expected$

College	Soda Pepsi	Preference Root beer	Sprite	Total
CMC	-2	-1	3	0
Pitzer	-2	+4	-2	0
Pomona	+4	-3	-1	0
Total	0	0	0	

3. $(Observed - Expected)^2/Expected$

College	Soda Pepsi	Preference Root beer	Sprite
CMC	0.33	0.06	1.5
Pitzer	0.5	1.3	1.0
Pomona	0.8	0.3	0.1