1. Suppose a random sample of 200 hikers was obtained. The hikers were asked if they would walk uphill, downhill, or remain where they were if they became lost in the woods. They were also classified as either a Novice or an Experienced hiker. The results are summarized in the following table.

	Uphill	Downhill	Remain	*Totals*
Novice	22	47	51	120
Experienced	8	33	39	80
Totals	30	80	90	200

The research question is as follows: Is there a significant association between the direction in which a lost hiker would travel and whether the hiker is experienced or a novice?

a. Create a mosaic plot (sketch it below) and then describe any association you see between the two variables of interest based on the observed data. (1 pt)

b. Write the null and alternative hypotheses needed to address the research question. (2 pts)

H$_o$:

H$_a$:

c. Use JMP to carry out an appropriate hypothesis test to determine if the observed association is statistically significant. Include your JMP output with your solutions (1 pt)

d. Provide the p-value and a conclusion written in everyday language that addresses the research question. (3 pts)

p-value: _____

Conclusion:

2. A company that manufactures blue jeans conducted an experiment using 98 samples of denim. Denim fabric naturally contains starch, creating stiffness in the fabric. Since customers often don't like the stiff feel of the fabric, the company treats the denim to make it feel "worn". The researchers used three different methods to treat the fabric samples: Alpha Amalyze, Caustic Soda, and Pumice Stone. Although the feel of the fabric is important, the company is also concerned about the strength of the treated fabric, which is measured by thread wear; so, the thread wear was also classified as either Low, Moderate, or Severe for each of the 98 samples. The data are posted on the course website (**Denim.jmp**).

The research question is as follows: Is there a significant association between the method used to treat the denim and thread wear?

a. Use JMP to find the counts needed to complete the contingency table below. Write these counts into the table. (1 pt)

Method	Thread Wear		
	Low	Moderate	Severe
Alpha Amalyze			
Caustic Soda			
Pumice Stone			

b. Write the null and alternative hypotheses needed to address the research objective (i.e., is there a significant association between method used to treat the denim and thread wear?). (2 pts)

H_o:

H_a:

c. Describe any differences you see in thread wear across the various methods based on the observed data. Use relevant percentages in your discussion. (2 pts)

d. Next, you will conduct a chi-square test to investigate this research question. In the table below, write the expected counts that are needed to compute the chi-square test statistic. (2 pts)

| Method | Thread Wear | | | |
	Low	Moderate	Severe	Total
Alpha Amalyze				
Caustic Soda				
Pumice Stone				
Total				

e. By hand, find the chi-square test statistic (you must show your work to earn full credit). (2 pts)

f. Use JMP to carry out the analysis. Include the output with your solutions. (1 pt).

g. Provide the p-value and a conclusion written in everyday language that addresses the research question. (3 pts)

p-value: _____

Conclusion: