Group Work - Week 10

1 Conduct tests for the scenarios below at a $\alpha = 0.05$ level of significance. Be sure to state your conclusion in the context of the question.

(a) Researchers discover a new gene which, under the right circumstances, could lead to a mildly inconvenient, but chronic, disease. 10% of the general population have the gene. One of the researchers thinks that people with naturally red hair are more likely to have the gene. Genetic tests are conducted on a sample of 65 redheads and it is found that 11 of them have the gene.

(b) A coffee shop is interested in the proportion of decaf coffee drinkers on Sunday and Monday mornings. The manager thinks they have a lower proportion of decaf drinkers on Monday. They examine a random sample of coffee orders and find that on Sunday 52 out of 156 orders are for decaffeinated coffee and on Monday 43 out 174 are decaf orders.

2 M&Ms are expected to have the following distribution:

Color	Blue	Brown	Green	Orange	Red	Yellow
Percent	24%	14%	15%	20%	13%	14%

(a) What is the minimum number of M&Ms needed to do a valid goodness-of-fit test against the expected distribution. In other words, what is the sample size n so that the smallest expected value is at least 5?

(b) Conduct a goodness-of-fit test of whether the distribution of M&Ms is what is claimed by the company at a significance level of $\alpha = 0.05$. Make sure to state the null and alternative hypotheses, and your conclusion in context of question.

2 The Tortilla and Cheese Organization (TACO) thinks that preferences for types of tacos are the same for men and women. They conduct a survey and collect the following data ("taco_preference.csv" on D2L):

	Type of taco			
Gender	Beef	Pork	Chicken	Fish
Men	105	34	56	27
Women	83	29	75	35

Test the claim the taco preference is the same for men and women at $\alpha = 0.05$ level of significance. Make sure to state the null and alternative hypotheses, and your conclusion in context of question.