# 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 have a different frequency of 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.