

**Stat 021 Fall 2020**  
**Class 5 Group Worksheet**

1. After field tests in 36 high schools over a three-year period, research compared the performances of students taught using a traditional mathematics curriculum to students who were taught using an innovative method developed by the Core Plus Mathematics Project (CPMP). Scores for 320 CPMP students were compared with those of a control group of 273 students in a traditional Math program. Determine if students who learn from the CPMP program have significantly higher mean scores than those in traditional programs.

**Population:** all high school students

**Observational units:** different students

**Sample size:**  $n_1=320$ ,  $n_2=273$

**Variable(s):** scores on test (quantitative), group membership (CPMP/traditional)

**Method/test:** un-paired two sample t-test

2. Data was collected on the average high temperatures in the months of January and July of 2020 for a dozen different cities. Suppose we want to determine if there is a significant difference in the mean temperatures between January and July.

**Population:** cities of the world

**Observational units:** different cities

**Sample size:**  $n=12$

**Variable(s):** temperature (quantitative), month (January/July)

**Method/test:** paired t-test

3. Many drivers of cars that can run on regular gasoline actually buy premium because they think they will get better gas mileage. To test that belief, we just 10 cars in a company fleet in which all the cars run on regular gas. Each car is filled first with either regular or premium gas, decided by a coin toss, and the mileage for that tankful is recorded. Then the mileage is recorded again for the same cars for a tankful of the other kind of gas. Drivers are not aware which type of gas is in the car at any given time.

**Population:** all cars

**Observational units:** cars

**Sample size:** 10

**Variable(s):** gas mileage (quantitative), gas type (regular/premium)

**Method/test:** paired t-test

4. A Gallup Poll asked 105 US adults if they actively tried to avoid carbohydrates in their diet. The number of positive respondents increased from 20% to 27% over the course of two years. Suppose we want to determine if that is a statistically significant increase.

**Population:** all US adults

**Observational units:** different people

**Sample size:**  $n_1 = 105$ ,  $n_2 = 105$

**Variable(s):** avoid carbs (yes/no), year (categorical)

**Method/test:** difference in proportions

5. A consumer magazine plans to poll car owners to see if they are happy enough with their vehicles that they would purchase the same model again. They randomly selected 450 owners of American-made cars and 450 owners of Japanese models and found that 76% of the owners of American cars responded favorably and 78% of the owners of Japanese cars responded favorably. Suppose we want to make a statistical statement quantifying the difference in owner satisfaction of American versus Japanese cars.

**Population:** all Japanese or American car owners

**Observational units:** different people

**Sample size:**  $n_1=450$ ,  $n_2=450$

**Variable(s):** would buy again (yes/no), car type (Japanese/American)

**Method/test:** difference in proportions

6. The Masterfoods Company claims that yellow candies make up 20% of its milk chocolate M&M's, red another 20%, orange, blue, and green 10% each. The rest are brown. Suppose you purchase a bag of plain M&M's and observe 29 yellow ones, 23 red ones, 12 orange, 14 blue, 8 green, and 20 brown. You want to determine if your sample is consistent with the company's stated proportions

**Population:** M&Ms manufactured by Masterfoods

**Observational units:** individual M&M candies

**Sample size:**  $n=29+23+12+14+8+20$

**Variable(s):** color (categorical, 6 levels)

**Method/test:** chi-square goodness-of-fit