Assume that the **Getting To Know You Survey** is a random sample drawn from the population of all U of M students. Use the following code to access data from the Getting To Know You Survey.

```
survey_f22 <- read.csv("http://users.stat.umn.edu/~parky/Fall2022Survey.csv", header=TRUE)
```

We are interested in testing the following two claims at the 0.05 significance level:

A. Instagram is the top social media for more than 40% of students at the U.

B. The average time students at the U spend per day on social media is less than 4 hours.

Problem 1

We will be working with the variable `FavSocialMedia`.

(i) What are the assumptions for conducting this hypothesis test? Are they met in this case?

(ii) Let p denote the true proportion of all U of M students whose most often used social media is Instagram. Write down the null hypothesis and the alternative hypothesis to test claim A.

(iii) Calculate the test statistic by hand.

(iv) Calculate the p-value. Interpret it.

(v) What is your conclusion?

(vi) Now repeat the analysis in `R` using the `prop.test()` function with the argument `correct = FALSE`. Show the `R` commands and the output. Does the result agree with what you have calculated previously? Note: The χ-squared value reported in `R` is the square of the test statistic z^*.

(vii) What type of error have you possibly made? Explain.

(viii) Construct a 95% confidence interval for p. Can we use this confidence interval to draw a conclusion for our hypothesis test?

Problem 2

We will be working with the variable `HoursSpentOnSocialMedia`.

(i) Let μ denote the average time U of M students spend per day on social media. Test claim B. Write down all five steps.

(ii) Now repeat the analysis in `R` using the `t.test()` function. You only need to show the `R` commands and the output. Does the result agree with what you have calculated previously?

(iii) What type of error have you possibly made? Explain.

(iv) Construct a 95% confidence interval for μ. Can you use this confidence interval to draw a conclusion for the hypothesis test? What if we want to test whether or not μ is equal to 4 (meaning that $H_a : \mu \neq 4$)?