1. Someone hands you a data set consisting of 100 consecutive iterations of a random process whose possible outcomes give values of 0 and 1 to a particular random variable. The sample resulting from the data set is (in the order collected):

   0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1.

(a) Why doesn’t it make sense to conduct a hypothesis test about the probability that this random variable will equal 1?

(b) What would probably be incorrect in your conclusions if you were to conduct a hypothesis test about the probability that this random variable will equal 1?

2. Which of the following statements is more informative and why?

   A. We conducted a hypothesis test with significance level 0.05 and found statistically significant evidence against the null hypothesis.
   B. We conducted a hypothesis test which resulted in a \( p \)-value of 0.0008.

3. Suppose you have a coin whose probability \( \lambda \) of “heads” when flipped in a certain way is constant but unknown. You decide that you don’t want to flip the coin more than 8 times, so you settle on a sample size of 8. Flipping the coin 8 times independently, you obtain:

   \[ T, T, T, H, T, H, H, T. \]

Conduct a hypothesis test of whether this method of flipping the coin is fair. (Use the usual significance level of 0.05.)

4. A particular bag of Plain M&Ms contains hundreds of M&Ms in six different colors: blue, brown, green, orange, red, and yellow. You draw 15 M&Ms independently at random from the bag (putting each M&M back in the bag after drawing it) and obtain the following colors:

   orange, blue, orange, red, green, green, blue, red, orange, green, yellow, brown, red, green, green.

Use this data to carry out a hypothesis test of whether the proportion \( \lambda \) of red M&Ms in this bag is 1/6. (Use the usual significance level of 0.05.)