Bias versus Random Error **Workshop**

1. Suppose you want to estimate the proportion of vehicles on the road in your hometown that are sport utility vehicles (SUVs). You decide to stand at the intersection closest to your house one morning between 7 and 8 AM, observing how many vehicles go by and how many are SUVs.

   (a) Identify the individuals, variable, population, sample, parameter, and statistic (all in words) in this study.

   (b) Explain why this sampling method is likely to be biased.

2. In each of the following situations, decide whether the result was caused by bias or random error.

   (a) A butcher charges too much because he weighs meat with his thumb on the scale.

   (b) A committee of six employees is randomly selected by drawing names out of a hat. All six end up being men.

3. The are two kinds of bias: **sample bias** is when the method for choosing the sample systematically leads to samples that are not representative of the whole population, and **non-sample bias** is when the sample might be representative, but there are other factors such as leading questions or measurement errors that systematically skew the results. For each of the following situations, (i) identify the population (ii) describe the sample, (iii) explain why there might be bias, and (iv) identify the bias as sample or non-sample bias.

   (a) A Fox News poll asks viewers to express their opinions on the candidates.

   (b) Randomly selected college students are asked about their sexual history during an in-person interview.

   (c) A sample of patients at a hospital are tested to see if they have antibodies against a certain disease. If the test tends to have a lot of false negatives, then the calculated proportion of patients with antibodies will probably be lower than the true value.