- 1. Functions and loops.
 - (a) Write a function to test whether an integer a is prime. Recall (or be surprised to learn!) that 1 is not a prime.

Homework 1

- (b) Using your function from (a) write a second function that takes an input \mathbf{n} and returns the n^{th} prime number.
- (c) Use the sapply function and your function from (b) to print the first 20 prime numbers.
- 2. Consider the following vector:

$$x \leftarrow c(91, NA, 90, 7, 67, NA, 87, 36, 2, 93, 27, 16).$$

Using only one line of code each, perform the following operations:

- (a) Remove the NA values from x.
- (b) Print the first, third, and eighth elements of x.
- (c) Print the elements of x that are greater than 50.
- (d) Print the odd elements of x.
- 3. The mtcars dataset is included with R. Use ?mtcars to learn about the data.
 - (a) Use ggplot to make a scatter plot of fuel efficiency and engine size.
 - (b) Add a horizontal line to the plot at the median of the y values.
 - (c) Add a vertical line to the plot at the median of the x values.
 - (d) Make a box plot of $\frac{1}{4}$ mile time vs number of engine cylinders. Describe what each aspect of your plot represents. i.e. What do the lines, box widths, whiskers, etc. represent?
- 4. Recall the trade-off between prediction and interpretation.
 - (a) Describe a situation where prediction would be more important than interpretation.
 - (b) Describe a second situation where interpretation is relatively more important than in your answer to (a).