# Exercise 1

Complete this exercises as a group and save your answers as well-commented R scripts. Be sure to discuss each question amongst all members of the group, and also feel free to explore multiple solutions to the same problem. I expect you will need to consult class notes and R help files. You are welcome to use any printed or web-based resources, as well. Groups will be randomly selected to present their answers in the next class meeting.

1. Given the circumferences for planets in our solar system, calculate the diameter of each planet in kilometers. You will also need the conversion factor from kilometers to miles (1 km = 0.621 miles) and the equation for a circle's circumference ($C$) based upon its radius ($r$): $C = 2\Pi r$.

| Planet | Circumference (miles) |
|---|---|
| Mercury | 9,525 |
| Venus | 23,628 |
| Earth | 24,900 |
| Mars | 13,264 |
| Jupiter | 279,118 |
| Saturn | 235,299 |
| Uranus | 99,786 |
| Neptune | 96,692 |

2. In three different ways, create and print a matrix named "B" that contains seven columns and 5 rows with all elements containing the value 7.

3. Enter the data table below into Excel and save as a R-readable text file. Load the file using the variable name "M" and answer the questions below.

a. Print the entire matrix
b. Calculate the mean of the second column.
c. Reverse the order of rows so that the most recent year's data is in the first row and the earliest year's data is last.
d. Find the year that had the lowest value in the second column.
e. Calculate the median of the second column for data collected in 2000 or later.

| | |
|---|---|
| 1998 | 10 |
| 1999 | 12.5 |
| 2000 | 15.6 |
| 2001 | 19.5 |
| 2002 | 24.4 |
| 2003 | NA |
| 2004 | 36.2 |
| 2005 | 27.7 |

4. Create a list of vectors called 'groupData'. This list should include the following vectors: 'ages', which contains the ages of everyone in your workgroup; 'names', which contains the names of everyone in your workgroup; and 'MvF', which indicates whether each member is male or female. Make sure you have each vector in the same order.

a. What is the mean of 2x the age of all females in the group?
b. What are the names of all male members of the group?
c. What is the age of the group member with the name that falls last in alphabetical order?

5. Calculate the coefficient of variation for each column of data in the provided data file ("water_chem.txt"). Also, calculate the difference between mean total phosphorus concentration (TP) for northern and southern lakes.