Assignment #11: Due December 6, 2018, 1pm

INSTRUCTIONS: Please upload **ONLY** the following file to Canvas: your R program (saved as LASTNAME_FIRSTNAME_HW11). Please make sure to use the setwd() function to create a path as was done in class and use that path to locate your data set. Please make sure to comment your code and appropriately document any functions written for the below simulations. For this assignment, please include all functions within the main program.

There is a data set Election data.csv that contains the approximate percentage of voters voting Democrat, Republican and Other for the 2016 United States Presidential election for each state (and Washington DC).

For those of you who are unfamiliar with the US election system, each of the 50 states, plus the District of Columbia are given a number of electoral votes. For the most part, those votes go the party who wins the popular vote within each state. The data set contains the number of electoral votes assigned to each state (Electoral.Votes). Even though there are two states that can split their electoral votes, for purposes of this exercise, we will assume that all votes go to the party winning that state. In order for a party to win the election, they must secure 270 electoral votes. If no party secures 270 votes, then for this simulation we will classify that election as Undecided.

Using the percentages for a given state as the probability of a given party winning that state (ignoring the sample size of the state), please conduct the following simulations:

1) Simulate the presidential election based on electoral votes using all three parties: Democrats, Republicans, and Other. (Hint: you will need to use the multinomial distribution)
2) Simulate the presidential election based on electoral votes assuming a two party system assuming probability of a state voting Democratic=Democrats+Other
3) Simulate the presidential election based on electoral votes assuming a two party system assuming probability of a state voting Republican=Republicans + Other
4) Simulate the presidential election based on electoral votes assuming a two party system assuming the Republicans and Democrats evenly split the Other probability

You are to conduct 10,000 mock elections for each scenario (1-4). For each of the scenarios 1 to 4, your code should do the following:

(a) Produce a single histogram (i.e. overlay) of the distribution of electoral votes for the Republicans and Democrats (ignore Other in creating the histogram in Scenario 1), indicate the 270 cut point for winning the election with a vertical line. Make sure that each histogram has an informative title, and appropriate axes labels.
(b) Output the probability of Democrats winning, Republicans winning, and having an undecided election. This probability should be based on the 10,000 mock elections (and the total should sum to 1).

Make sure that your results are reproducible. Make sure that the code is generalizable (e.g. can enter a different number of mock elections or a different set of probabilities).