Homework 2

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#Problem 1: Katie budgets 30 minutes each morning for her commute to work regardless of the time she leaves home. One week she left home at exactly 8am every day and recorded the amount of time it took for her to get to her office. The next week she left home at exactly 8:30am every day and recorded the amount of time it took for her to get to her office.

a) Create and store a matrix called commutes with a column representing each week containing the following information:
   - On Monday of the two weeks, she arrived in 25 and 24 minutes, respectively
   - On Tuesday of the two weeks, she arrived in 36 and 27 minutes, respectively
   - On Wednesday of the two weeks, she arrived in 21 and 36 minutes, respectively
   - On Thursday of the two weeks, she arrived in 34 and 33 minutes, respectively
   - On Friday of the two weeks, she arrived in 25 and 32 minutes, respectively

(b) Label the rows of commutes with the corresponding day of the week and label the columns with the labels Week1 and Week2.

(c) Compare her commute on each day of the week and determine whether she arrived faster leaving at 8:30am or not each day.

(d) Determine the average commute time for each weekday over the two week period.

(e) Determine how many minutes over her budgeted time each commute lasted (early arrivals should be negative values) and save these values in a matrix called diff.

(f) Determine the average difference over each week.
Note: Do not manipulate the values prior to calculating the averages.

(g) Determine the maximum delay over each week.

(h) Determine the day(s) of the second week on which she arrived to work within 25 minutes.
Note: Only the day(s) of the week should print.

(i) Determine the number of days in each week that she arrived within her budgeted time.

(j) On which day(s) did she arrive the fastest in the first week?
Note: Only the day(s) of the week should print. Hint: Use the row names.

(k) Subset the matrix of differences to the day(s) of the week on which her commute was similar over the two weeks (ie. both days under budget or both days over budget).

#Problem 2 The Davis data set in the car package contains recorded weight (kg), recorded height (cm), reported weight (kg), reported height (cm), and sex assigned at birth for each subject of a study.

(a) Subset the recorded weight and reported weight columns and save them in a data frame named weight.metric. Print the first few rows.
(b) Convert the weights in weight.metric to pounds (1 kg = 2.2 lbs) and name the resulting data frame weight.imp. Print the first few rows.
(c) Subset the recorded height and reported height columns and save them in a data frame named height.metric. Print the first few rows.
(d) Convert the heights in height.metric to inches rounded to one decimal (2.54 cm = 1 inch) and name the resulting data frame height.imp. Pring the first few rows.
(e) Combine the sex assigned at birth information with all of the imperial weight and height information in a data frame named Davis.imp with column names sex, rec.weight, rep.weight, rec.height, and rep.height. Print the first few rows.
(f) Determine the number of missing values (NA) in each column of the Davis.imp data.
(g) How many rows of the Davis.imp data contain a missing value. Note: Do not make assumptions.
(h) Subset the sex assigned at birth of the subjects with a missing value.

#Problem 3

In your astronomy class you have been tasked to create a data set to record the major characteristics of the 8 planets in our solar system in their order from the sun: Mercury (0.39 AU), Venus (0.72 AU), Earth (1 AU), Mars (1.52 AU), Jupiter (5.2 AU), Saturn (9.54 AU), Uranus (19.18 AU), and Neptune (30.06 AU). The first major characeteristic is the type of planet: the closest four are terrestrial and the furthest four are gas. The next major characteristic is the planet's diameter relative to the diameter of Earth: 0.382, 0.949, 1, 0.532, 11.209, 9.449, 4.007, 3.883; followed by the planet's rotation across the sun relative to that of the Earth: 58.64, -243.02, 1, 1.03, 0.41, 0.43, -0.72, 0.67. The next characteristic is whether or not the planet has rings: the closest four do not and the furthest four do. The final characteristic is the number of moons: Mercury and Venus have none, Earth has one, and the remaining have more than one.

(a) Create, save, and print the required data frame using the column labels name, distance, type, diameter, rotation, rings, and moons for the columns.

(b) Subset to a data frame that contains any planet(s) with a diameter less than five times that of the Earth.

(c) Determine the distance away from the sun of any planet(s) that have the same rotation direction across the sun of the Earth.

(d) Subset the data frame to show only the name, number of moons, and type of any planet(s) that have a larger diameter than Earth.

(e) Subset the data frame to show only the presence of rings and type of any planet(s) that have more than one moon.