**Assignment 1 Report**

**12032373徐浩翔**

1. The three number a, b and c are output in a sorted form from largest to smallest.
2. Method: Simply using *+* and *\**.
3. Method: Within the loop, firstly initialize a vector “*temp\_line*” which has length as k-1. Then add result from the previous line named “*line*” in scripts (if it’s the result of 3rd line, its previous line has already initialized outside the loop). After one loop was done, re-value the “*temp\_line*” as “*line*”, which is the previous line for nest loop. Display the line when the loop counter reaches k. It has to be noted that the first and last element “*1*” are not stored in value “*line*” or “*temp\_line*”, I add these two “*1*” when printing the result (thus, kth line should contain k elements, but the length of “*line*” is k-2).

Result are showed in script.

1. Method: By permutated “*1*” and “*2*” as the meaning of “+1 RMB” and “double the money”, we obtain all the permutations of result. Then calculate them all and find which one is least approaches towards what we want.
2. Method: By using “*eval(parse(text=string))*” function to apply strings as code, in order to test if the result is what we want. Strings are obtained from permutations by insert *+*, *-*, or *blank* into the series of numbers 1~9.

Result are showed in script.

1. Method: Function “*unclass(as.POSIXct(strptime(string,format)))*” to convert time data into the absolute seconds from 1970-01-01 00:00:00. This is a numeric value, which is helpful to deal with.

Conclusion in 6.1: Visibility has a significant seasonality, no obvious reduction or increase trend between years was found.

Conclusion in 6.2: Data length in 2013 are too short compared with other years (due Apr. only), we here don’t take visibility in 2013 into account due to its seasonality. Comparison result shows nearly no significant trend between years. Table of grouping data was showed in script result.

1. Conclusions:

Note: 2020 here means the lockdown period from 23rd Jan. to 10th Mar. due to data limitation. And the same corresponding period in 2019.

* 1. The mean concentration of PM2.5 and ozone for full data period (2018 to 2020/03/11) are: 55.71μg/m3 and 28.77 ppb.
  2. Based on the figures we can reveal the PM2.5 and ozone have a significant chemical coupling (Figure was plotted in RStudio, figure shows the entire time series of full data period).
  3. Mean concentration during lockdown (PM2.5 unit in μg/m3, ozone in ppb) compared to the same period in 2019:

2019 2020

PM2.5 78.13 51.14

O3 18.63 28.09

A reduction of PM2.5 was observer but for O3 is an increase during the lockdown.

* 1. Concentration STD during lockdown compared to the same period in 2019:"

2019 2020

PM2.5 35.62 25.60

O3 13.38 12.48

Less data volatility was indicated.

* 1. Part of the contribution for ozone increase is the chemical coupling between PM2.5 and ozone, while the other contribution might be background concentration transmitting because nearly little emission was in production during lockdown in Wuhan.