ALGONQUIN COLLEGE

Computer Engineering Technology – Computing Science

Course: Numerical Computing – CST8233
Term: Fall 2021

Assignment #2

Due Date: Friday, November 12th, 2021 before 11:59 pm.
Earning: This assignment worth 7% of your final course mark.

The objective of this assignment is to learn how to use menus to prompt users with different options. Also, you will learn how to use regression to find the best fit of a given data and how to use this fit to extrapolate, i.e., estimate, a new data.

Submission:

Please submit ONE file that contains R script. To test the code, I only need to run one function called, `bestFitFun()`. You can create as many functions as you like, however, to test your code only one function will be called.

Task:

You are given a file called "`assignment2.xlsx`" that includes some data on COVID-19 pandemic in Canada. Read the data in this file and save it as "`COVID19_data`". Use `summary()` function to show the minimum, 1st quartile, median, mean, 3rd quartile, and the maximum of all columns except the first two.

You are asked to find the best fit function of the total vaccinations administered on daily basis. You decided that the function has the form:

$$TV = a \times e^{b\,t}$$

where TV is the total vaccinations, a and b are constants, and t is the day. Write R code that calculates the values of these two constants using regression.

Refer to the example given in the lecture and follow the steps to transform the data to linear regression.

Your final code should present two menus to the user. The first menu will ask the user to choose to perform the exponential fit or to quit.

```
MENU
 1. Exponential Fit
 2. Quit
```

If the user selects `1`, then the following message must appear:

```
Please enter the name of the file to open:
```

The user will enter the file name as "`assignment2.xlsx`". Then, the user is prompted with the following messages:

```
Please enter the start date (dd/mm/yyyy):
Please enter the end date (dd/mm/yyyy):
```

The dates must fall between `01/02/2021` to `01/05/2021`. The end date must be greater than the start date by `60` days.

The code will find the best fit using the exponential function and then print the function to the user. Then, the user will be prompted with the second menu:

```
MENU
 1. Extrapolation
 2. Main Menu
```

If the user selects `1`, the code will ask the user to enter the date they would like to extrapolate to:

```
Please enter the date to extrapolate to (dd/mm/yyyy):
```

The code will calculate the estimated total vaccinations on that date and print it. If the user selects `2`, the code goes back to the previous menu.

Plot the total vaccinations data during the entered range and plot the best fit function on the same graph. You need to use the right titles for the graph, x-axis, and y-axis. Save the plot as `total_vacc.pdf`.