Assignment 1 - CT5102

Exploring Vectors - Synthetic Weather Data

The aim of this assignment is to create a synthetic data set for the mean daily temperature observations, and then perform analysis on the data set. We assume temperature follows a normal distribution, with a mean of 7 and a standard deviation of 4. The first task is to set the random number generator seed to 100.

```
set.seed(100)
```

Next, generate the random values (100) and round each value to 1 decimal place using the **round()** function.

The following are the daily temperature values.

```
temps
```

```
##   [1]  5.0  7.5  6.7 10.5  7.5  8.3  4.7  9.9  3.7  5.6  7.4
##  [12]  7.4  6.2 10.0  7.5  6.9  5.4  9.0  3.3 16.2  5.2 10.1
##  [23]  8.0 10.1  3.7  5.2  4.1  7.9  2.4  8.0  6.6 14.0  6.4
##  [34]  6.6  4.2  6.1  7.7  8.7 11.3 10.9  6.6 12.6 -0.1  9.5
##  [45]  4.9 12.3  5.5 12.3  7.2 -0.5  5.2  0.0  7.7 14.6 -2.1
##  [56] 10.9  1.4 14.3 12.5  3.6  6.0  6.7  5.5 17.3  7.5  4.1
##  [67]  9.6  7.8  6.7  6.6  8.8  2.7  2.4 13.6 -1.2  7.1  2.6
##  [78]  8.1 11.0 -1.3 10.6  6.8  1.6 -0.7  9.8  6.4  7.9 10.3
##  [89] 13.9  6.6  4.8 12.7  3.4  2.4  4.9 16.8  3.7  8.7  2.3
## [100]  2.3
```

Next, name the vector so that we can see the day number, for example:

```
head(temps)
```

```
##  D-1  D-2  D-3  D-4  D-5  D-6
##  5.0  7.5  6.7 10.5  7.5  8.3
```

```
tail(temps)
```

```
##  D-95  D-96  D-97  D-98  D-99 D-100
##   4.9  16.8   3.7   8.7   2.3   2.3
```

Perform the following tasks:

1. Calculate and display the number of days where the temperature was greater than the mean

```
gt_mean
```

```
## [1] 48
```

2. Display the day with the maximum temperature, using **cat()**

```
## The max temp was on day  D-64 with a value of  17.3
```

3. Display the day with the minimum temperature

```
## The min temp was on day  D-55 with a value of  -2.1
```

4. Create a parallel vector called **warnings**, which has two values "Warning" or "Normal", where a temperature weather warning is in place if the temperature is less than or equal to 4.0.

```
temps[40:44]
```

```
## D-40 D-41 D-42 D-43 D-44
## 10.9  6.6 12.6 -0.1  9.5
```

```
w_warnings[40:44]
```

```
##      D-40      D-41      D-42      D-43      D-44
##  "Normal"  "Normal"  "Normal" "Warning"  "Normal"
```

5. Display the number of days where the weather warning was in operation

```
## The number of days the warnings were in operation =  22
```

6. Display the days where the weather warning was in operation

```
ww
```

```
##  [1] "D-9"   "D-19"  "D-25"  "D-29"  "D-43"  "D-50"  "D-52"
##  [8] "D-55"  "D-57"  "D-60"  "D-72"  "D-73"  "D-75"  "D-77"
## [15] "D-80"  "D-83"  "D-84"  "D-93"  "D-94"  "D-97"  "D-99"
## [22] "D-100"
```

7. Display the warning in a tabular format

```
tw <- table(w_warnings)
```

```
tw
```

```
## w_warnings
##  Normal Warning
##      78      22
```

8. Use the function **`rle()`** to find out the maximum sequence of weather warnings in the data. Note **`rle()`** returns a list showing the lengths and the values.

```
## The maximum run of days with warnings was  2
```

```
## The maximum run of days without warnings was  13
```