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Grading:

30 marks- Complete submission of Problem 1,3

70 marks- Problem 3

1. Security guard Hasini has a log book of the CMI-Shuttle. In the log book she keeps track of the kilometer reading before each time driver Sakshi fills petrol. The last 10 readings are:

65311, 65624, 65908, 66219, 66499, 66821, 67145, 67447, 67786, 68103

- (a) Enter these numbers into R as a variable `kreading`. Use the function `diff` on the data. What does it give?

```
> kreading = c(65311, 65624, 65908, 66219, 66499, 66821, 67145, 67447)
> differences = diff(kreading)
```

Write down, x , the number of kilometers between each time Sakshi fills up petrol.

- (b) Use the `max` to find the maximum number of kilometers, the `mean` function to find the average number of kilometers and the `min` to get the minimum number of kilometers Sakshi has driven between two fill-ups.

Solution: 1

- (a).

```
> kreading=c(65311, 65624, 65908, 66219, 66499, 66821, 67145, 67447, 67786, 68103)
> differences=diff(kreading)
> differences
```

```
[1] 313 284 311 280 322 324 302 339 317
```

The command `diff` returns suitably lagged and iterated differences. By default `lag=1`. Sakshi has driven 313, 284, 311, 280, 322, 324, 302, 339 and 317 kilometers between each petrol fill-ups.

- (b).

```
> max_diff=max(differences)
> max_diff
```

```
[1] 339
```

The maximum number of kilometers Sakshi has driven between two fill-ups is 339.

```
> min_diff=min(differences)
> min_diff
```

```
[1] 280
```

The minimum number of kilometers Sakshi has driven between two fill-ups is 280.

```
> mean_diff=mean(differences)
> mean_diff

[1] 310.2222
```

The average number of kilometers Sakshi has driven between two fill-ups is 310.2222.

2. Super Mani's quiz scores in Data science are given below

7, 6, 10, 8, 7, 9, 9, 6, 4, 10, 8, 6, 9, 10

- Enter this into R as a variable `scoreMani`. Use the function `max` to find the highest score, the function `mean` to find the average and the function `min` to find the minimum.
- When confronted by Looser Siva, Mani realises that entry 4 was a mistake. It should have been 5. How can you fix this? Do so, and then find the new average.
- What does the below command provide in R ?

```
> sum( scoreMani >= 9)
```
- What do you get? What percent of your scores are less than 17 ? How can you answer this with R?

Solution: 2

- ```
> scoreMani=c(7, 6, 10, 8, 7, 9, 9, 6, 4, 10, 8, 6, 9, 10)
> highest_Score=max(scoreMani)
> highest_Score
```

```
[1] 10
```

Highest score of Super Mani is 10.

```
> lowest_Score=min(scoreMani)
> lowest_Score
```

```
[1] 4
```

Lowest score of Super Mani is 4.

```
> mean_Score=mean(scoreMani)
> mean_Score
```

```
[1] 7.785714
```

The average score of Super Mani is 7.79.

- ```
> new_scoreMani=replace(scoreMani,which(scoreMani==4),5)
> new_scoreMani
```

```
[1] 7 6 10 8 7 9 9 6 5 10 8 6 9 10
```

```
> new_mean_Score=mean(new_scoreMani)
> new_mean_Score
```

```
[1] 7.857143
```

The new average score of Super Mani is 7.86.

- ```
> sum(scoreMani>=9)
```

```
[1] 6
```

It returns the number of quizzes in which Super Mani's score is greater than or equal to 9 i.e. 6 quizzes

```
(d). > count=sum(scoreMani<17)
> Total=length(scoreMani)
> percent_scores=(count/Total)*100
> percent_scores
```

```
[1] 100
```

All i.e. 100% of scores are less than 17.

3. Naina's cell phone bill varies from month to month. Suppose in her first year of Super DATA (hons.) program, under the Drop-atmost 10-calls monthly plan, the following monthly amounts were incurred:

460, 330, 390, 370, 460, 300, 480, 320, 490, 350, 300, 480

- Enter this data into a variable called `Nainabill`. Use the `sum` command to find the amount spent by Naina that year on the cell phone.
- Using R find out what is the smallest amount she spent in a month and the largest amount she spent in a month ?
- How many months was the amount greater than Rs 400? What percentage was this?
- If her monthly loan from NOMoney Bank was Rs 3000. Using R store her balance(after paying her phone bill) in a variable called `freemoney`. Find the average amount available each month for her other expenses.

### Solution: 3

```
(a). > Nainabill=c(460, 330, 390, 370, 460, 300, 480, 320, 490, 350, 300, 480)
> Totalbill=sum(Nainabill)
> Totalbill
```

```
[1] 4730
```

The total bill paid by Naina is Rs. 4730.

```
(b). > smallest_bill=min(Nainabill)
> smallest_bill
```

```
[1] 300
```

The smallest monthly bill paid by Naina is Rs. 300.

```
> largest_bill=max(Nainabill)
> largest_bill
```

```
[1] 490
```

The largest monthly bill paid by Naina is Rs. 490.

```
(c). > count=sum(Nainabill>400)
> count
```

```
[1] 5
```

The bill amount was greater than Rs. 400 for 5 months.

```
> Total_count=length(Nainabill)
> percent_months=(count/Total_count)*100
> percent_months
```

```
[1] 41.66667
```

Hence, for 41.67% of the months, the bill amount is greater than Rs. 400.

```
(d). > freemoney=3000-Nainabill
> freemoney
```

```
[1] 2540 2670 2610 2630 2540 2700 2520 2680 2510 2650 2700 2520
```

```
> average_freemoney=mean(freemoney)
> average_freemoney
```

```
[1] 2605.833
```

The average amount available each month for her other expenses is Rs. 2605.83.