

Problem Set 2 Exercise #28: Car

Reference: Lecture 6 notes

Learning objectives: Functions with Pointers; Algorithm design

Estimated completion time: 60 minutes

Problem statement:

[CS1101 AY2009/10 Semester 1 Sit-in lab#1 Question]

Write a program **car.c** that reads in data about your car and print out some statistical information.

The input data includes:

1. **Initial odometer value:** the initial value of odometer (a non-negative real number of **double** type) before making any trip today. The odometer value on the car displays up to a maximum value of 999.9, after which it restarts from 000.0 again. (An odometer is an instrument in a car for measuring the distance travelled.)
2. **Trips:** the number of trips made by the car today. This is an integer in the range 0 to 9, both inclusive.
3. **Distance per trip:** for each trip, the distance the car has travelled (a positive real number of **double** type). Note if there are 3 trips today, you will read in three distances one by one, each corresponding to one trip.

You may assume that the odometer value and distance per trip has at most one decimal place.

After all above information are read, your program should compute (1) the final odometer value, (2) the average distance of all trips today, and (3) the maximum difference in distance between two consecutive trips. Your program then displays the outputs as shown in the sample runs below (next page).

For example, in the sample run #1 below, the difference in distance between trip 1 and trip 2 is 4.8, while the difference in distance between trip 2 and trip 3 is 10.8. Hence the maximum difference is 10.8.

Study the sample runs carefully so as to ensure that you have understood the question clearly.

Your program should contain a function

```
void compute_statistics(double *odometer_p, int trips,
                       double *avg_dist_p, double *max_diff_p)
```

that reads information of all trips, updates the final odometer value, average distance per trip and max difference in distance in trips through three pointers.

You should correct your output of real numbers to one decimal place.

Sample run #1:

```
Initial odometer value: 980.5  
Number of trips today: 3  
Distance for trip 1: 23.8  
Distance for trip 2: 19  
Distance for trip 3: 8.2  
Final odometer value: 31.5  
Total number of trips: 3  
Average distance per trip: 17.0  
Maximum difference between two consecutive trips: 10.8
```

Sample run #2:

```
Initial odometer value: 820.3  
Number of trips today: 1  
Distance for trip 1: 1563.2  
Final odometer value: 383.5  
Total number of trips: 1  
Average distance per trip: 1563.2  
Maximum difference between two consecutive trips: 0.0
```

Sample run #3:

```
Initial odometer value: 70  
Number of trips today: 0  
Final odometer value: 70.0  
Total number of trips: 0  
Average distance per trip: 0.0  
Maximum difference between two consecutive trips: 0.0
```