

Programming Assignment: Average Miles Per Gallon

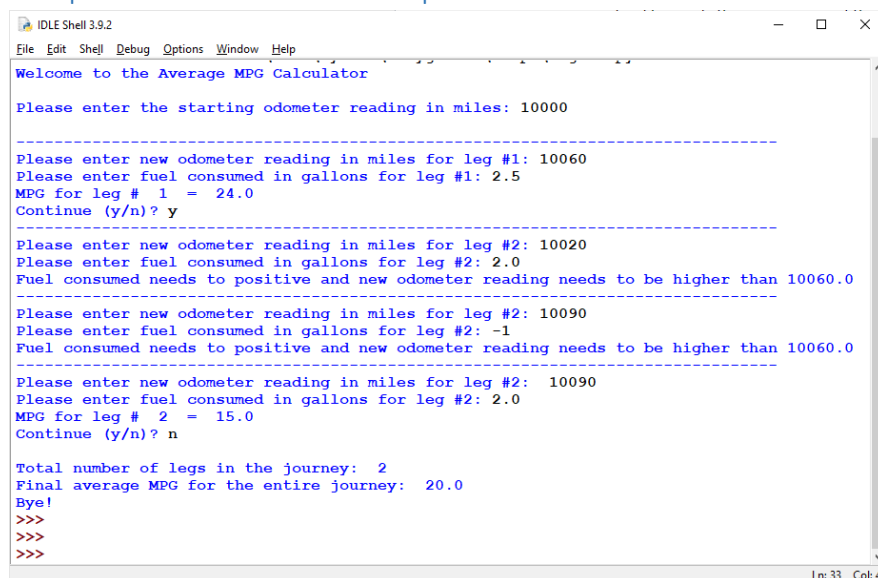
Problem Statement:

In this assignment, you will write a program that computes fuel efficiency of a multi-leg journey for a vehicle. The program

1. Asks user for the starting odometer reading (in miles). Using a while loop validates that the reading is positive, if not, prompts the user to enter a valid mileage value.
2. Next
 - a. Asks the user for odometer reading and amount of fuel in gallons used for the next leg of journey.
 - b. Validates that the odometer reading is more than the last odometer reading and that the fuel is a positive number, if not prompts the user again till valid values are entered.
 - c. Computes the miles per gallon (mpg) for this leg.
 - d. Prints the mpg for this leg.
3. Asks user if there are additional legs for which the program should continue.
 - a. If yes, repeats step 2
 - b. Else prints the average mpg of the entire journey by dividing the total miles travelled over all the legs by the total fuel consumed in all the legs. (It is NOT the average of all the mpgs from the different legs)

Here are some sample runs of the program:

Sample 1 with some invalid inputs



```
IDLE Shell 3.9.2
File Edit Shell Debug Options Window Help
Welcome to the Average MPG Calculator

Please enter the starting odometer reading in miles: 10000

-----
Please enter new odometer reading in miles for leg #1: 10060
Please enter fuel consumed in gallons for leg #1: 2.5
MPG for leg # 1 = 24.0
Continue (y/n)? y

-----
Please enter new odometer reading in miles for leg #2: 10020
Please enter fuel consumed in gallons for leg #2: 2.0
Fuel consumed needs to positive and new odometer reading needs to be higher than 10060.0

-----
Please enter new odometer reading in miles for leg #2: 10090
Please enter fuel consumed in gallons for leg #2: -1
Fuel consumed needs to positive and new odometer reading needs to be higher than 10060.0

-----
Please enter new odometer reading in miles for leg #2: 10090
Please enter fuel consumed in gallons for leg #2: 2.0
MPG for leg # 2 = 15.0
Continue (y/n)? n

Total number of legs in the journey: 2
Final average MPG for the entire journey: 20.0
Bye!
>>>
>>>
>>>
```

Sample 2:

```
Python 3.8.1 Shell
File Edit Shell Debug Options Window Help
RESTART: D:\code\python\Playground\loops\avgmpg.py
Welcome to the Average MPG Calculator

Please enter the starting odometer reading in miles: 12200

-----
Please enter new odometer reading in miles for leg #1: 12285
Please enter fuel consumed in gallons for leg #1: 1.5
MPG for leg # 1 = 56.666666666666664
Continue (y/n)? y
-----
Please enter new odometer reading in miles for leg #2: 12310
Please enter fuel consumed in gallons for leg #2: 2.2
MPG for leg # 2 = 11.363636363636363
Continue (y/n)? y
-----
Please enter new odometer reading in miles for leg #3: 12532
Please enter fuel consumed in gallons for leg #3: 4.2
MPG for leg # 3 = 52.857142857142854
Continue (y/n)? n

Total number of legs in the journey: 3
Final average MPG for the entire journey: 42.0253164556962
Bye!
>>>
>>>
```

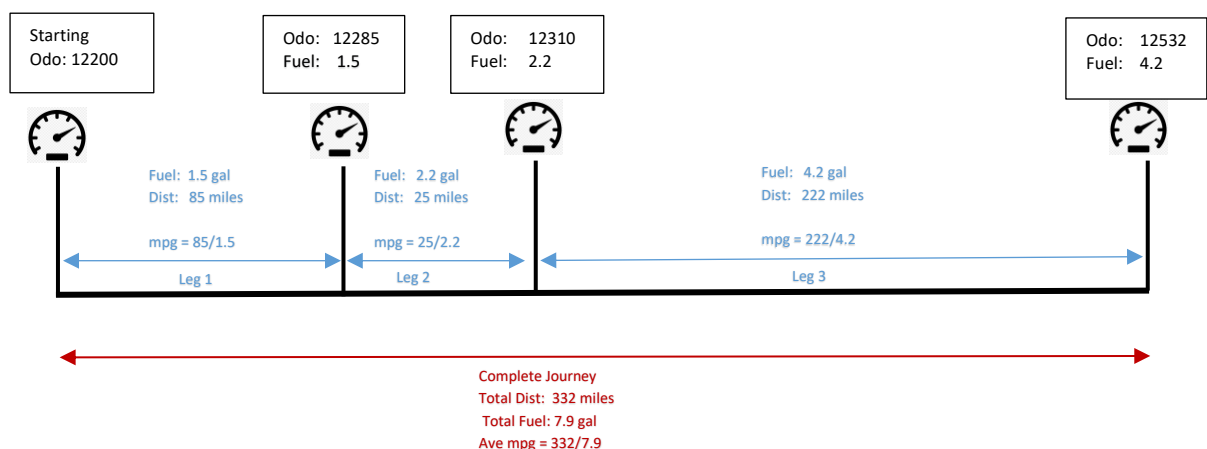
You should test your program with the inputs shown in the samples and check that your calculations are correct.

NOTE:

- To help you plan your code, a high-level program outline (pseudo code) for this problem is included. You can structure your code based on this pseudo code.
- Make sure your program works with multiple legs (not just 2 or 3).
- The final average MPG should be calculated as

$(\text{total miles travelled during all the legs of the journey}) / (\text{total fuel consumed by all the legs of the journey})$

It is NOT calculated as the average of all the individual MPGs. The figure below shows the calculations for the second sample run shown above with 3 legs of journey:



Save your program to a file with a name of the format first_last_AvgMPG.py. Submit this file.

Pseudocode:

Print greeting

Prompt the user for starting odometer reading

Use a while loop to validate that starting odometer reading is a positive number.

Initialize variables: last odometer reading, current odometer reading, leg number, total fuel, moreInput

While moreInput == 'y'

 Prompt the user for new odometer reading and fuel consumed

 If fuel is positive and new odometer reading > last odometer reading:

 Calculate MPG for this leg using $\text{mpg} = (\text{new odometer} - \text{last odometer}) / \text{fuel}$

 Print MPG for this leg

 Update last odometer reading, total fuel, leg number

 Ask if user wants to continue (save user response in moreInput)

 Else

 Print message saying fuel should be positive and new odometer reading should be greater than last odometer reading (see the first sample run below)

Print number of legs

Calculate average MPG over entire journey (= Total miles travelled / total fuel consumed)

Print average MPG over entire journey

Print Bye message.