Road Trip Planning

Filename: gastank

The Problem:

You are taking a road trip and have several possible places where you can stop for gas. Assume that when you start your trip, you already have a full tank of gas. Whenever you stop for gas, you always fill the tank. Finally, when you reach your destination, you don't fill your tank. If your calculated cost for filling the tank at a single gas station has a fractional number of cents in it, round to the nearest cent. (Thus, $1.254 will actually cost $1.25 but $1.255 will actually cost $1.26.) Your goal is to minimize the amount of money you pay for gas on the trip.

The Input:

There will be several data sets in the input file, each data set providing the information on gas stations and the trips to take for that configuration.

The first line of each data set contains three integers n, g, and m. n ($2 \le n \le 50$) represents the total number of gas stations in the current configuration (each trip starts at a gas station and ends at a gas station). g (> 0) represents the number of gallons of gas the car can hold. m (> 0) represents the number of miles per gallon the car travels.

The next n input lines will contain information about each gas station (first line being gas station 1, second line gas station 2, etc.) Each line of this list contains n+1 values separated by spaces. The first n values (each a non-negative integer) represent the distance (in miles) from the current gas station to each gas station (assume that the distance beween the i^{th} and j^{th} gas stations will be the same as the distance between the j^{th} and i^{th} gas stations). The last value (a real number > 0) represents the price of gasoline at that gas station in dollars per gallon.

The next input line for a data set will contain a positive integer t, representing the number of trips to be taken for the current configuration. Each of the following t input lines contains two integers (each between 1 and n, inclusive), representing the starting and ending gas stations for a road trip.

End of data is indicated by three zeros (i.e., a data set with n=0, g=0, and m=0).

The Output:

Print a heading for each data set with the format, "`Data set #k:`", where k is the data set number, starting at 1. Then, print a heading for each trip followed by an appropriate message for the trip.

If it is possible to take a road trip, output the message, "The minimum cost for gas is $X.XX.", where $X.XX is the minimum cost for gas for the trip. The dollar amount should be printed to two decimal places. If the cost of the trip is under a dollar, a leading zero before the decimal point must be printed. In all other cases, no leading zeros should be printed for the dollar amount. (Assume that the minimum cost for any possible road trip is less than $10000.00.)

If it is impossible to take the given road trip, (meaning that no matter what path is traversed you will always hit an empty tank **before** reaching a gas station at some point in the journey), then output the message, "The trip is impossible to complete." Note that it is acceptable for the car to run out of gas exactly when it reaches a gas station (the car can not run out of gas before reaching a gas station).

Leave a blank line after the output for each data set. Follow the format illustrated in the Sample Output.

Sample Input:

```
2 10 30
0 20 1.35
20 0 1.22
1
1 2
4 10 20
0 150 190 290 1.55
150 0 40 140 1.75
190 40 0 100 1.25
290 140 100 0 1.77
2
1 4
2 3
2 10 10
0 200 1.34
200 0 1.22
1
1 2
0 0 0
```

Sample Output:

```
Data set #1:
   Trip #1:
      Starting gas station: 1
      Ending gas station: 2
      The minimum cost for gas is $0.00.

Data set #2:
   Trip #1:
      Starting gas station: 1
      Ending gas station: 4
      The minimum cost for gas is $11.88.
   Trip #2:
      Starting gas station: 2
      Ending gas station: 3
      The minimum cost for gas is $0.00.

Data set #3:
   Trip #1:
      Starting gas station: 1
      Ending gas station: 2
      The trip is impossible to complete.
```