Problem 3

Going The Distance

60 Points

Program Name: distance.java Input File: distance.in

Choosing a long-distance plan can be quite complicated. Many plans give callers a fixed number of minutes for a flat monthly fee, with additional minutes being charged at a premium rate. This gives callers an incentive to choose a plan wisely to avoid paying too much for their service.

Write a program that can determine the best long-distance plan for a given caller given the caller's number of minutes used per month and the information for all available plans.

Input

The first line of input will contain a single integer, *n*, indicating the number of data sets to process. The remainder of the input consists of those *n* data sets.

Each data set will begin with a line containing two integers, *p* and *c*, where *p* indicates the number of calling plans available and *c* indicates the number of callers that need to have their optimal plan calculated.

The next *p* lines of the data set list details for each of the long distance plans, and are formatted "Plan <pname> <minutes> $<prmonth> $<additional>" where <pname> is the name of the plan, <minutes> is the number of minutes included per month for the <prmonth> monthly fee, and <additional> is the cost for each minute used in excess of <minutes>.

The next *c* lines of the data set list details for each caller that must choose between the plans and are formatted "<cname> <minutes>", where <cname> is the customer's name, and <minutes> is the number of long-distance minutes that this person uses each month.

Output

For each data set in the input output the header line:

Data set #*X*

where *X* is 1 for the first data set, 2 for the second, etc.
Then, for each caller in the data set, output the message:

<cname> should choose plan <pname> for $<mcost> per month.

Where <cname> and <pname> are caller and plan names from the data set and <mcost> is the lowest monthly cost the caller can achieve from the available plans when using the specified number of minutes. You can safely assume that there will always be a single plan with the lowest cost (i.e., no ties).

Display the cost to 2 decimal places.

Example Input File

```
2
2 2
Plan A 100 $10.00 $0.15
Plan B 200 $20.00 $0.15
Ralph 150
Lauren 250
3 3
Plan UnlimitedPlus 0 $29.95 $0.00
Plan OneRate 0 $3.95 $0.07
Plan TalkTime 30 $3.50 $0.10
Julius 1000
Caesar 200
Chavez 10
```

Example Output To Screen

```
Data set #1
Ralph should choose plan A for $17.50 per month.
Lauren should choose plan B for $27.50 per month.
Data set #2
Julius should choose plan UnlimitedPlus for $29.95 per month.
Caesar should choose plan OneRate for $17.95 per month.
Chavez should choose plan TalkTime for $3.50 per month.
```