

CS 121 – Lab #12 – Two practice problems

Write a Python program that solves each of the problems below. Feel free to help each other. When you are ready to test your programs, consult the class Web site for the input files `gong.txt` and `bookmaker.txt`. Have the instructor or lab aide check your work.

Program #1: The Village Gong

In a certain remote village, monks announce the passage of time by striking a gong every ten minutes throughout the day and night. The gong is struck at exactly midnight, and at every ten minute interval after that, at 12:10:00, 12:20:00, etc.

Your job is to figure out how long it will be until the monks will next strike the gong.

An instance of this problem is a string of the form `<h>:<m>:<s>` that represents the current time in a 12-hour format, where `h`, `m` and `s` are integers and $1 \leq h \leq 12$, $00 \leq m \leq 59$, $00 \leq s \leq 59$. For each instance, your program is to determine the integer number of seconds until the next strike of the gong. If the current time happens to be the precise moment when the gong is being struck, then output 0.

The first line of the input will be the number of test cases. On each subsequent line is a separate test case.

Example input:

```
4
8:11:47
12:05:00
7:19:59
4:50:00
```

Example output corresponding to the above input

```
493
300
1
0
```

Program #2 The Bookmaker

Declan's parents are horse trainers. So, naturally, he grew up around horses, and he always had a casual interest in them. However, Declan never liked getting too close to the creatures. He was not interested in riding horses, or training them, or mucking out after them. Instead, he was more interested in financial matters and betting. And he got his chance to test the waters when he got a part-time job with a bookmaking firm at a large racetrack.

And today is Declan's first day on the job. His boss has given him an assignment to test his skill with numbers. Declan needs to calculate the potential payout amount for each bet. He also needs to be able to estimate the firm's profit margin. These are necessary skills in order for Declan to succeed on the job. Let's write a computer program to help him.

The input to the program will be a list of bets. Each bet will have a dollar amount being wagered by the bettor, followed by the odds of the bettor winning. For each bet, the program needs to determine the payout. The payout is the amount of money the bettor will potentially win, based on the wagered amount and the odds. Finally, after processing all of the bets, the program will determine the bookmaker's expected profit, which is always nine percent (9%) of the total amount of money wagered by all bettors.

There are three kinds of odds:

- Odds against (e.g. 10 to 1 against), which means the horse is not likely to win.
- Odds on (e.g. 4 to 1 on), which means that the horse is more than likely to win.
- Even money, which means there is a 50/50 chance of the horse winning.

Odds against are so common that the word "against" is omitted.

The first line of input will indicate the total number of bets. The format of the first line is

```
<number> bets
```

where the <number> is a positive integer between 2 and 100, inclusive.

Each subsequent line of input will show one bet. The format of these input lines will follow one of the following three patterns:

```
$<number>, <number> to <number>  
$<number>, <number> to <number> on  
$<number>, even money
```

Each <number> will be a positive integer between 1 and 1000, inclusive. The first number on the line is the bet amount. The odds of winning the bet appear after the comma. The word "on" may optionally appear at the end of the line, and this indicates that the horse is more than likely to win. Both the bet amount and odds are used to determine how much money the bettor will win if the horse wins the race.

Here is how to compute the payout amount. For each dollar wagered by the bettor, the payout will be:

- $\$(1 + a/b)$, if the odds are a to b against
- $\$(1 + b/a)$, if the odds are a to b on
- $\$2$ if the odds are even money

Your program should print the payout for each bet in the same order that the bets appear in the input. That is, there should be no attempt to sort the output. The payout of each bet should appear this way:

```
Bet <number> payout is $ <money>
```

The <number> is the sequential number of the bet, starting with 1. The <money> must be rounded to 2 decimal places. Also note that there needs to be a space on either side of the dollar sign.

After processing all of the bets, the program should compute the bookmaker's expected profit, which is 9% of the sum of all of the bet amounts. This result should be written in a sentence as follows:

```
Expected bookmaker profit is $ <money>
```

Here too there should be a single space on either side of the dollar sign, and the amount of <money> must be rounded to 2 decimal places. Your output should look like the example output below.

Note that in this program, there is no information about which horses won. In other words, we are not concerned about which bets are successful. The program will calculate payout amounts assuming that all bets win. Of course, in real life, some bets will lose, and the bettor would not receive a payout in those situations, but that is beyond the scope of this program.

Example input:

```
4 bets
$50, 15 to 8
$100, even money
$20, 7 to 4 on
$5, 100 to 1
```

Example output corresponding to the above input:

```
Bet 1 payout is $ 143.75
Bet 2 payout is $ 200.00
Bet 3 payout is $ 31.43
Bet 4 payout is $ 505.00
Expected bookmaker profit is $ 15.75
```