November 8, 2014

Taylor High School

Hands-On Contest

Bake-Off Contest
Ode to Adams

"The computer scientist's main challenge is not to get confused by the complexities of his own making."

~E. W. Dijkstra

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You will have 2 hours to complete the programming portion of the contest. There is a 5 point deduction for each incorrect submission to a problem that is later solved. If the problem is never solved there will be no points deducted from the overall score. Problems are not in any order of difficulty.

1. Cakescii

"Cakes are special. Every birthday, every celebration ends with something sweet, a cake, and people remember. It's all about the memories."

~Buddy Valastro

General Statement: Little Andy is turning 4 years old today! Unfortunately, no one is around to celebrate his coming of age with him. All he has for companionship is his computer – so for his birthday he decides to create a virtual cake for himself. Help Andy.

Input: None.

Output: Andy's cake.

Sample Input: None

Sample Output:

```
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
\....................................\
\...............@....................\
\..............@@....................\
\..............@.@...................\
\...............@....................\
\..............X.....................\
\..............@.@...................\
\.........@@@@@.@@@@@.................\
\.....@@@@.....@.@.....@@@@.....\
\...@@.........@@@.........@@...\
\...@.@@@..............@@@.@...\
\...@....@@@@@@@@@@@@@@....@...\
\...@@......................@@...\
\...@.@.@@...@@@@.....@@@.@.@...\
\...@..@..@.@....@..@@...@..@...\
\...@......@......@@........@...\
\....@@....................@@....\
\......@@@.............@@@......\
\.........@@@@@@@@@@@@@.........\
\....................................\
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
```

2. Educaketion

"I don't love studying. I hate studying. I like learning. Learning is beautiful."

~Natalie Portman

General Statement: Andy needs to learn math. Help Andy double-distribute (FOIL) two binomial terms. The formula is given below:

$$(x + a)(x + b) = x^2 + ax + bx + ab = x^2 + (a + b)x + ab$$

Input: The first line contains an integer *n* which represents the number of datasets to follow. Each dataset contains the expression in the form of (x+a)(x+b), in which *a* and *b* are both positive single digit integers (0-9) and *x* is the variable.

Output: Output the simplified double-distributed form of the expression.

Assumptions: Each x will always have a coefficient of one and be to the first power.

Sample Input
```
5
(x+2)(x+2)
(x+6)(x+3)
(x+0)(x+0)
(x+4)(x+1)
(x+3)(x+9)
```

Sample Output
```
x^2+4x+4
x^2+9x+18
x^2
x^2+5x+4
x^2+12x+27
```

3. Investment Baker

"In school, my favorite subject was math. That's where I learned to count money."

~French Montana

General Statement: Now that Andy knows math, he can sell cakes. He decides to become an investment baker. Andy sells one cake for $480 (he needs to make a sweet profit). Customers will buy a number of cakes, but they may not pay exact change. Help Andy give his customers the right amount of change back.

Input: The first line contains an integer n which represents the number of datasets to follow. Each dataset contains integers a, the number of cakes a customer buys, and b, the amount of money a customer pays for all of those cakes.

Output: The change Andy needs to pay back.

Assumptions: All numbers used will be integers. A customer will buy at least one cake and pay at least the total cost of cakes.

Sample Input:
```
3
1 480
5 2405
314 159265
```

Sample Output:
```
$0
$5
$8545
```

4. Uniform Resource Locaketor

"I'm scared of the Internet."

~Andrea Parker

General Statement: Andy is making a website for his cake business and is trying to link to other sites, but the hyperlinks looks really ugly for some reason. He read online that URLs are percent encoded. Help Andy fix up these ugly URLs.

Percent encoding is done by replacing ASCII characters with a percent sign followed by two hexadecimal numbers. For example, %61 would be equivalent to 97 which in ASCII value would be 'a'.

Input: The first line contains an integer **n** that represents the number of datasets. Each dataset contains an encoded hyperlink.

Output: Output the pretty, decoded hyperlink.

Assumptions: There are no assumptions.

Sample Input:
```
3
http%3A%2F%2Fgoogle.com%2Fhow%20to%20do%20things
http%3A%2F%2Fwww.andyscakeshop.com%2F
http%3A%2F%2Fwww.foreveralone.org
```

Sample Output:
```
http://google.com/how to do things
http://www.andyscakeshop.com/
http://www.foreveralone.org
```

5. All Ends in Tiers

"Crying is all right in its way while it lasts. But you have to stop sooner or later, and then you still have to decide what to do."

~C.S. Lewis, The Silver Chair

General Statement: After some experimenting, Andy invented and transcribed a secret recipe for his ideal tangible cake, but some of the letters have become smeared with his blood, sweat, and tears. However, he remembers all the ingredients he needs and proceeds to fill in the blanks, now with a pen that won't smudge. Help Andy fill in the correct ingredients.

Input: The first line contains the list of the ingredients that Andy remembers. Each ingredient is separated with a space. The next line contains an integer *n* that represents the number of datasets to follow. Each dataset contains a step that must be fixed. Missing letters are represented with hyphens.

Output: The corrected steps.

Assumptions: There is only one correct solution for each step. Each ingredient will only be used once. There is no punctuation.

Sample Input:
```
BUTTERMILK  FLOUR  BAKINGSODA  COCOA  CHERRIES  SALT  EGGS  VANILLAEXTRACT
CREAM SUGAR TEARSOFLONELINESS HUGS WARMTH SHORTENING - appears in one line in the
```
dataset
```
5
Mix the F--UR CO-O- --KING--DA -UGA- and SA-T in a bowl
Combine the -UTTER---- E-G- -HO-T--I-- and --N----E--R--T into the mix
Imbue the cake with H--S and WA--T- by baking the batter for 30 minutes
Decorate the cake with C--R-IES and -R-AM in a circular pattern
Sprinkle with T--R------E---E-S and enjoy
```

Sample Output:
```
Mix the FLOUR COCOA BAKINGSODA SUGAR and SALT in a bowl
Combine the BUTTERMILK EGGS SHORTENING and VANILLAEXTRACT into the mix
Imbue the cake with HUGS and WARMTH by baking the batter for 30 minutes
Decorate the cake with CHERRIES and CREAM in a circular pattern
Sprinkle with TEARSOFLONELINESS and enjoy
```

6. Mid-Slice Crisis

"I rebel, therefore I exist."

~Albert Camus

General Statement: Andy is an insolent child. He has predefined responses to different types of sentences. Help Andy decide how to respond.

Input: The first line contains an integer *n* that represents the number of datasets to follow. Each dataset contains a sentence that you must respond to.

Output: Print out "A'ight, wha'ever." if he is responding to an interrogative sentence. Print out "Dood, tha's jus like you are 'pinion man." if he is responding to a declarative sentence. Print out "Quit killin' me vibes mon." if he is responding to an exclamatory sentence.

Assumptions: There are no assumptions.

Sample Input:
```
4
How much do you cry at night?
That's quite a lot.
Do you need any tissues?
Well, get your own!
```

Sample Output:
```
A'ight, wha'ever.
Dood, tha's jus like you are 'pinion man.
A'ight, wha'ever.
Quit killin' me vibes mon.
```

7.Knead to Know

"I write letters to you that you'll never see."

~Jennifer Elisabeth

General Statement: Andy receives a cake basket from a secret admirer with a letter attached. The letter is encrypted, but fortunately, the basket also came with a decryption code. Help Andy decode the letter.

Key: ABCDEFGHIJKLMNOPQRSTUVWXYZ
Cipher: XBZYPFGQCAVEISLUKJWNODRHTM

It seems to be a simple substitution cipher. However, there is a number next to each encrypted phrase that shifts the cipher left or right. Help Andy decrypt the encrypted letter.

Input: The first line contains an integer **n** that represents the number of data sets to follow. Each dataset contains one integer which serves as the amount to shift followed by the phrase needed to be decrypted.

Output: Print out the lines of the decrypted note.

Assumptions: All letters are capital and there can be punctuation.

Sample Input:
```
3
-7 DNYH BE TNI
27 YBEF AN IURF
16 WKXO TC BTDO
```

Sample Output:
```
CAKE IS FAT
CAKE IS LOVE
CAKE IS LIFE
```

8. Whisk Her Away

"All you need is the plan, the road map, and the courage to press on to your destination."

~Earl Nightingale

General Statement: Andy has a crush on Yumi. He wants to give her a cake as a confession of his love. Yu and Mi are Yumi's parents, and they don't want Andy around Yumi because they think he is a jerk. Andy will be caught if he is in any of the 8 spaces surrounding Yu or Mi. Andy can only move up, down, left, or right; he cannot traverse through corners. Help Andy find the fastest way possible to deliver the cake to Yumi without getting caught by Yu or Mi.

Input: The first line contains an integer **n** which represents the number of datasets to follow. The first line of each dataset contains 2 integers **r** and **c**, separated with a space. The following **r** lines contains the maze. The maze consists of **r** rows and **c** columns.

'@' represents a wall
'.' represents traversable space
'D' represents a doorway, another traversable space
'A' represents Andy and the starting space
'Y' represents Yu
'U' represents Yumi and the ending place
'M' represents Mi

Assumptions: There is always a solution.

Output: Output the minimum number of steps required to reach the end.

Sample Input:
```
3
5 5
@@@@@
@YM.@
@...@
@UDA@
@@@@@
10 10
@@@@@@@@@
@.....@@@@
@.U......@
@......@@@
@..M...Y.@
@......@@@
@........@
@..@@@@..@
@..D..D.A@
@@@@@@@@@
```

Input continued on next page

```
22 33
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@................................@
@...............@................@
@..............@@A...............@
@..............@U@...............@
@.............@D@................@
@.............@.@................@
@.............@.@................@
@.........@@@@@.@@@@@.........@
@.....@@@@.....@.@.....@@@@.....@
@...@@.........@D@.........@@...@
@...@.@@...........M....@@.@...@
@...@...D@@@@@@@@@@@@@@D...@...@
@...@@.....................D@...@
@...@.@.@@...@D@@.....@@@.@.@...@
@...@..D..@.@....@..@@...@..@...@
@...@......@......@@........@...@
@....@@.....................@@...@
@......@@@....Y........@@@......@
@.........@@@@@D@@@@@.........@
@................................@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
```

Sample Output:
2
12
60

9. Baking Bad

"However beautiful the strategy, you should occasionally look at the results."

~Winston Churchill

General Statement: Andy's business isn't doing so well. He has sold all of his ovens. As a result, Andy needs to find a new way to create his wedding cake. The amount of time it takes to bake the layers of the cake to perfection varies with each method. Andy can grill, iron, blow dry, deep fry, yell at, or microwave the layer. He doesn't know exactly how long each method takes to bake the layer, but he does know this:

It takes three times as long blow drying than grilling. Ironing is twice as fast as blow drying. Microwaving is one sixth as fast as grilling. Grilling takes four times as long as baking. Deep frying is four times as fast as microwaving. Baking takes 1000 seconds. Yelling will take 8.315 x 10^5 longer than ironing.

Help Andy determine how much time each method will take to "bake" his cake.

Input: The first line contains an integer **n** that represents the number of datasets to follow. Each dataset contains an integer **L** that represents the number of layers on his cake. The next **L** lines contains a method that Andy will use to "bake" that layer.

Output: Print out the seconds it takes to "bake" the whole cake with the given method(s) rounded to the nearest hundredth. If the time it takes to "bake" is greater than 2^{31} - 1 seconds, then print out "This cake is RAW."

Assumptions: There are no assumptions.

Sample Input:
```
4
1
grill
2
iron
yell
2
deep fry
iron
3
grill
blow dry
microwave
```

Sample Output:
```
4000.00
This cake is RAW.
6166.67
16666.67
```

10. The Desserted

"We should call this one CAKETUS. Like cactus, but CAKEtus."

~Matias Hanco

General Statement: Andy and Yumi decide to spend their honeymoon in the desert with a tour group. One morning, Andy oversleeps and the group leaves without him. Help Andy reach the tour group by calculating the amount of time it takes for Andy to reach them using this equation:

$$d + st = at$$

where **d** is the distance the tour group has already traveled in meters when Andy departed, **s** is the speed of the tour group in meters per second, and **a** is Andy's speed to catch up in meters per second.

Input: The first line contains an integer **n** that represents the number of datasets to follow. Each dataset contains an integer **d**, a decimal **s**, and a decimal **a**, separated with a space in a single line.

Output: Output the minutes it takes for Andy to reach his tour group rounded to the nearest hundredth.

Assumptions: The tour group's speed and Andy's speed are constant. Andy will always travel faster than the tour group. The tour group and Andy are traveling in the same direction to the same location. There will be caketi but they don't inhibit Andy's progress.

Sample Input:
```
2
300 .5 5
1000 .25 3.3
```

Sample Output:
```
1.11
5.46
```

11. Make It Or Bake It

"Some people want it to happen, some wish it would happen, others make it happen."

~Michael Jordan

General Statement: Andy is on Cake Boss and wants to beat the Bae King in a competition. He needs to make a cake that will wow the judges. The three qualities that the judges look for in a cake are taste, presentation, and fat content. Of the overall score, taste is worth 20%, presentation is worth 30%, and fat content is worth 50%. He must make the best cake within a certain size limit. Each ingredient he uses will have 4 qualities: taste, presentation, fat content, and size. Help Andy get the highest score.

Input: The first line contains an integer **n,** which represents the number of ingredients. The next **n** lines contain the name of the ingredient, taste points, presentation points, fat content points, and size. The next line contains an integer **m** representing the number of datasets. The next **m** lines contain an integer **s** which represents the maximum size of the cake Andy can make.

Output: Output the list of ingredients and the amount each ingredient used in alphabetical order that will give Andy the maximum points. Separate each dataset with an extra line.

Assumptions: All numbers in the input will be integers. Andy has an unlimited amount of ingredients.

Sample Input:
```
5
chocolate 4 4 4 12
tearsofloneliness 2 2 2 1
cherry 2 2 2 2
flower 1 1 1 1
carrot 10 10 10 4
2
10
14
```

Sample Output:
```
carrot x 2
tearsofloneliness x 2

carrot x 3
tearsofloneliness x 2
```

12. Oh My Ganache

"We've spent so much time judging what other people created that we've created very, very little of our own."

~Chuck Palahniuk

General Statement: Andy's investment baker thing didn't work out. He now judges the quality of cakes. Their quality will be determined by their vertical symmetry from the side of the cake. Help Andy determine the quality of cakes.

Input: The first line contains an integer *n* that represents the number of datasets. The first line of each dataset contains integers *r* and *c* separated with a space. The next *r* lines contains *c* characters of the side of the cake to be judged.

Output: If the cake is of good quality, Andy will say "Oh. My. Ganache." If the cake is not of good quality, Andy will say "OH. MY. GANACHE.".

Assumptions: The decorations will only be represented by numbers. The side of the cake will always be a rectangle.

Sample Input:
```
3
3 20
-3----3------3----3-
--3----3----3----3--
---3----9--9----3---
2 2
3-
-3
10 8
---33---
---33---
---00---
---88---
---33---
---33---
---33---
---22---
---33---
---33---
```

Sample Output:
```
Oh. My. Ganache.
OH. MY. GANACHE.
Oh. My. Ganache.
```

13. Poundcake

"I want to lose weight by eating nothing but moon pies [cakes]"

~Jarod Kintz

General Statement: Andy wants to lose weight after eating a baker's dozen cakes. He needs to exercise everyday and bake glutton-free cakes. Given the number of calories he eats each day, help Andy lose weight using the formula:

$$E_k = (\tfrac{1}{2})mv^2$$

E_k = kinetic energy in joules
m = mass in kilograms
v = velocity in meters per second

1 Calorie = 4.184 Joules

Input: The first line contains an integer n that represents the number of datasets. Each dataset contains an integer c and a decimal m, each separated with a space on one line. c represents the number of calories Andy wants to burn. m represents Andy's mass in kilograms.

Output: Output the minimum velocity in meters per second Andy must reach to burn those calories. Round to the nearest thousandths.

Assumptions: Assume that Andy has a velocity and a loathe of bread, even if it may seem unrealistic.

Sample Input:
```
3
3000 80.0
9999999 56.524
6254 100.5
```

Sample Output:
```
17.714
1216.730
22.820
```

14. Bake it Off

"~I shake it off, I shake it off~"

~Taylor Swift

General Statement: Taylor Swift plans on releasing her new hit song; however, Andy accidentally bumps into her in the restroom, causing her to hit her head on the toilet, so she loses some of her proficiency in the English language. With her deftness in Java, she has created a String of what she believes her song lyrics to be, but she gets certain words confused with others. Help Andy help Taylor out by outputting an array with the correct song lyrics to give to her publisher.

❤ Don't mess up, Taylor Swift is depending on you ❤

KEY:
- The word "you" must be replaced with "Kanye"
- The word "22" must be replaced with "Kobe".
- Any word starting with the lower case letter 'w' must be replaced by "Wilbur"
- Every 12th word must be replaced with "don't" (this is the very last step, after all other alterations)

Input: The first line contains an integer *n* that represents the number of words in Taylor Swift's String of lyrics. Each word is separated by a space.

Output: Output the array of corrected lyrics.

Assumptions: There are no assumptions.

Sample Input:
48
Uh oh I don't know about you but I'm feeling 22 Everything will be alright if you keep me next to you You don't know about me but I'll bet you want to Everything will be alright if we just keep dancing like we're 22 ooh-ooh 22 ooh-ooh

Sample Output:
[Uh, oh, I, don't, know, about, Kanye, but, I'm, feeling, Kobe, don't, Wilbur, be, alright, if, Kanye, keep, me, next, to, Kanye, You, don't, know, about, me, but, I'll, bet, Kanye, Wilbur, to, Everything, Wilbur, don't, alright, if, Wilbur, just, keep, dancing, like, Wilbur, Kobe, ooh-ooh, Kobe, don't]