

臺北市立第一女子高級中學 98 學年度

資訊學科能力競賽初賽

程式設計試題



2009.06.06

答題注意事項：

1. 請留意題目的說明，題目中未提及的事項，請勿自行假設。例如題目若要求輸入一個整數，則勿假設此整數必為正整數。
2. 所有答題的程式，必須依題意的要求而終止。例如題目要求輸入0 後結束，則答題程式必須在輸入0後終止執行。
3. 評分時的測試資料由評分老師提供，僅測試完成題目上的輸入輸出範例，並不能保證該題能得到滿分。
4. 每題程式需在 1 分鐘內執行出結果，否則不予計分。
5. 程式編寫時間：09:10 ~ 11: 40
6. 程式測試時間：11:45 ~ 12:10

故事的開始

這一天，是妳期待已久的資訊能力競賽。抱持著既緊張又害怕受傷害的心情，妳一大早就來到了學校。當妳踏進學校大門的那一刻，忽然一陣昏天黑地，在妳下一次有意識的時候，妳已經來到了一棟奇怪建築的門口，妳向四周望去，卻沒有發現任何其他人的蹤跡。妳雖然感到害怕，但是一想到如果沒有趕快回去可能會趕不及參加資訊能力競賽，所以妳決定硬著頭皮走進入這棟建築物。走進去之後，妳發現這棟建築物的大廳距離妳所在的位置不遠處有一面相當高但未及天花板的牆，擋住了向後的去路。雖然牆的後面是什麼妳完全未知，但是為了參加競賽，妳努力地讓自己冷靜，試圖尋找方法通過。

注意事項

1. 所有輸入輸出皆為標準輸入輸出
2. 測試時一次執行只會輸入一筆測資，不須多重輸入輸出
3. 多餘的輸出會被判定為錯，請注意題目要求的格式
4. 請記得刪除將程式暫停的程式碼(Ex: `system("Pause");`)
5. 每一題的執行檔請放在 C:\你的學號目錄，並如下命名

Problem A	C:\你的學號\pA.exe
Problem B	C:\你的學號\pB.exe
Problem C	C:\你的學號\pC.exe
Problem D	C:\你的學號\pD.exe
Problem E	C:\你的學號\pE.exe



Problem A 打開吧高牆

環顧四週，妳發現牆角有一台桌上型電腦、一台筆電和一把梯子，其中桌上型電腦的螢幕上有兩個數字，還有幾行字：「歡迎來到康普特博士的魔幻基地，妳現在看到的牆和梯子都是魔幻基地的產物，它們會隨著時間產生不定的變化。唯一可以確定的一件事情是，梯子的長度會大於牆的高度。妳可以從我這裡得知眼前牆的高度和梯子的長度，而如果妳想要通過這道牆，就必須找出按鈕，告訴我按鈕距離牆的最短距離是多少。只要你能答對，牆就會自動打開。記住：按鈕的位置會在把梯子頂端架在牆頂時，梯子尾端所接觸的地面上。」聰明的妳馬上就想到可以透過程式直接計算出答案，在筆電上開始寫程式。

當妳開始寫程式的時候，不知道何方突然傳出了一個聲音：「之後不論妳遇到了什麼，妳都可以選擇按下 page down，直接跳到下一關，也可以選擇解決這個問題。至於差別，最後就知道了。」

Input

輸入有一行，包含兩個浮點數 W, L ($1 \leq W < L \leq 10000$)，分別代表牆壁的高度和梯子的長度。

Output

請輸出一行結果，代表按鈕和牆壁的距離 (取四捨五入至小數點兩位)。

Sample Input

4.00 5.00

Output Sample

3.00



Problem B 密碼之門

當牆壁打開之後，拿起筆電，妳鼓起勇氣向前走去，又發現前方有一道牆，這次牆是高及天花板的，妳發現牆上有道門，門上有一道密碼鎖，要你輸入四個數字。你到處張望，發現左方的牆上有一大行你不一定看得很懂的句子，下方標著寫著「一為其長，二為大寫字母數，三為小寫字母數，四為數字數」。聰明如妳一看就知道那是什麼意思，但是因為這句子實在是太長了，所以你決定用剛剛拿來的筆電，再寫出一支程式來解決這個問題。

Input

輸入一行半形字元，長度不會超過 1000 個字元。

Output

請輸出一行結果，該行必須有四個整數(以空白隔開)，代表門上的密碼。

Sample Input

I'm Happy, Hello World! 123, 321, 1234567 we are happy GOOD Children.

Output for sample input

69 9 30 13

備註：對這道門來說，跳脫字元(Ex:換行字元('\n'))並不佔有任何長度。



Problem C Dr.K 的數字遊戲

獨身闖過兩關，妳遇到了一個自稱為 Dr. K 的人，他眯著眼睛打量著妳一陣之後說：「很好、很好，大有前途」，同時也從身後拿出了一個奇妙的遊戲盤，上面有一長排數字，他告訴妳說：「相鄰的兩個數字，消掉其中一個數字的花費即為另一個數字的大小，一直玩下去，到只剩最後一個數字時遊戲結束。只要你能答出花費最少時消掉數字的和，我就會指引妳向下走去的道路。」精明的妳，一下子又想到了方法，打開筆電開始寫程式.....

在把遊戲盤交給妳之前，Dr.K 說：「暴力的，不一定最聰明，思考吧！」

Input

輸入的第一行會有一個整數 $N(1 \leq N \leq 100)$ ，代表遊戲盤上有多少個數字。
第二行會有 N 個數字 $n_i(1 \leq n_i \leq 10000)$ ，中間以空白隔開。

Output

輸出只有一行，包含一個整數，代表花費最少時消掉數字的和。

Sample Input

```
6
4 9 3 10 100 74
```

Output for sample input

```
197
```



Problem D 天文數字

「怎麼一片漆黑！」Dr.K 指引給妳的道路使得妳來到了一個一片漆黑的房間，正當妳開始焦急比賽時間是不是已經逼近的時候，這一片漆黑突然轉成了一大片的星空，有數也數不清的星星。妳身後傳來了一個聲音：「啊終於算完了，可是這些要怎麼加在一起呢.....」妳轉過頭去發現是一個貌似古代占星術士裝扮的老人，手中拿著一疊紙，每一張紙上面都寫了一長串的數字，他告訴妳：「這些數字是我數了數十年的星星數，我把妳現在看到的這片星空切成了好幾塊，一塊一塊數，昨天終於數完了！但是數十年來我都在數數，現在已經不會其他的事情了，只要把這片星空的星星總數算出來，這片黑暗就會消退，路就會出現，我們就能離開這裡了。」為了離開這裡，妳決定再次展現妳的拿手絕技——寫程式！

「啊，妳要幫我嗎？真的太感謝妳了。」占星術士這麼說之後，將手上的一疊紙交給了妳。

Input

輸入的第一行有一個整數 $N(1 \leq N \leq 50)$ ，代表占星術士把天空切割成了幾塊
接下來的 N 行，每一行有一個很長的非負整數 N_i ， N_i 至多不會超過 100 位。

Output

針對整份輸入，請輸出一個數字，代表星空中究竟有多少顆星星。

Sample Input

```
4
11111111
22222222
33333333
4444444444
```

Output for sample input

```
48011111110
```



Problem E 小孩的遊戲

「可惡怎麼又沒路了！我要參加資訊能力競賽啦！！這到底是怎麼樣啊！」正當妳已經失去了耐性的時候，旁邊突然出現了一個小朋友，拿著三根柱子跟一堆大小不等圈圈出現，拉著妳的袖子說：「姊姊、姊姊，教我玩！馬麻說，教我玩的姊姊才可以帶她過去！」妳看了看他手中的玩具，問：「這個規則是什麼？」他告訴妳：「馬麻說，大圈圈一定要在小圈圈下面，一次只能移動一個圈圈，一共有 N 個圈圈，三根棍子的編號是 1、2、3，一開始的時候圈圈都放在棍子 1 上，只要用最少的步驟全部移到棍子 3 上，就是我贏了！」妳想起了好像有那麼一個傳說，『很久很久以前在某個地方有個寺廟，有一天出現了一個謎樣的僧侶，自稱能夠預測世界末日是什麼時候.....』這個時候小朋友打斷了妳，「姊姊妳會玩嗎？教我玩好不好？」「啊現在不是想故事的時候，交給我吧！」「耶！謝謝姊姊！」

Input

輸入只有一行，包含一個整數 $N(1 \leq N \leq 10)$ ，代表圈圈的數量。

Output

請輸出移動圈圈的步驟，以棍子編號表示即可(請參考範例輸出)

Sample Input

3

Output for sample input

1->3
1->2
3->2
1->3
2->1
2->3
1->3



終

跟著小朋友走出第五道關卡，妳忽然又感到一陣昏天黑地，下一次再有意識的時候，妳正站在電腦教室外頭，「太好了這樣應該有趕上吧？」妳看了看手錶卻發現，「啊！天哪！已經比完了，怎麼辦.....」妳很苦惱不知道該怎麼解釋剛剛發生的事情，妳愣愣地想著這一切，忽然那個小朋友的聲音傳入妳的腦海：「耶！謝謝姊姊！」，隨後妳又想起了占星術士蒼老的臉上感激的神情，還有自己解開關卡時的成就感。雖然錯過了資訊能力競賽，可是這段奇妙的經歷讓妳體會到，程式是可以用來幫助別人，訓練自己思考的。雖然過程中一直很想要趕快通關，但是寫程式的時候妳其實是樂在其中的，妳正在解決問題，不管如何其實這個過程使妳收穫良多.....想到這裡妳笑了出來，推開電腦教室的門走了進去。

「哈哈，真是英雄出少年，恭喜妳通過了考驗，接下來，將會是不一樣的訓練唷！」

妳終於明白原來妳經歷的這一切就是資訊能力競賽，但其實真正的考驗是在數個月之後，這次競賽的目的，只是要選擇有勇氣挑戰問題，克服一切的人。



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TFG 972 testcase

Problem A

- (1). 1.00 10000.00
9999.00 10000.00
 - (2). 3.45 6.78
9.57 8787.00
 - (3). 8.00 15.00
105.44 788.69
 - (4). 411.99 499.99
99.99 100.00
 - (5). 33.11 44.55
66.77 77.88
-

Problem B

- (1). I don't want to GIVE UP, I just like to fly. I can Fly 1000km high!

If there is one thing the history of evolution has taught us it's that life will not be contained. Life breaks free, expands to new territory, and crashes through barriers, painfully, maybe even dangerously. AAAAAAAAAAAAAAAAAA!!!123123123

- (2). I hope that whoever you are, you escape this place. I hope that the world turns and that things get better. But what I hope most of all is that you understand what I mean when I tell you that even though I do not know you, and even though I may never meet you, laugh with you, cry with you, or kiss you, I love you. -V for Vendetta (2005)

I'm a big believer in symbols as a way to communicate. The symbolism of this bridge is just amazing to me because I've spent my career trying to be a bridge. My goal was always to connect people from different disciplines, while helping them find their way over brick walls. - Randy Pausch, 2008

- (3). I do not at all believe in human freedom in the philosophical sense. Everybody acts not only under external compulsion but also in accordance with inner necessity. Schopenhauer's saying, "A man can do what he wants, but not want what he wants," has been a very real inspiration to me since my youth; it has been a continual consolation in the face of life's hardships, my own and others', and an unfailing well-spring of tolerance. This realization mercifully mitigates the easily paralyzing sense of responsibility and prevents us from taking ourselves and other people all too seriously; it is conducive to a view of life which, in particular, gives humor its due. -- The World As I See It, Albert Einstein Test123

TWO roads diverged in a yellow wood, And sorry I could not travel both And be one traveler, long I stood And looked down one as far as I could To where it bent in the undergrowth; Then took the other, as just as fair, And having perhaps the better claim, Because it was grassy and wanted wear; Though as for that the passing there Had worn them really about the same, And both that morning equally lay In leaves no step had trodden black. Oh, I kept the first for another day! Yet knowing how way leads on to way, I doubted if I should ever come back. I shall be telling this with a sigh Somewhere ages and ages hence: Two roads diverged in a wood, and I-- I took the one less traveled by, And that has made all the difference. -- Robert Frost,1874-1963

- (4). On September 18, 2007, Carnegie Mellon professor and alumnus Randy Pausch delivered a one-of-a-kind last lecture that made the world stop and pay attention. It became an Internet sensation viewed by millions, an international media story, and a best-selling book that has been published in 35 languages. To this day, people everywhere continue to talk about Randy, share his message and put his life lessons into action in their own lives.

The meaning of things lies in the process, not in the result. "Socrates" uses a method to show Dan this. He took him on a long hiking trip and tells him he wants to show him something at the destination. So they hiked for 3 hours. Dan got really tired but it was anticipation that kept him going. At last, when Socrates announced that it was a rock that he wanted to show Dan, Dan lost his temper. But he also told Dan, "You were happy along the way". At last Dan realized that, if he put all his meaning in the end result, he will not be truly happy. It is only when he can enjoy every moment of his journey, that he can be constantly happy. I think that was when Dan let go of his sole purpose of practicing gym - winning the Gold Medal. Having let go of that goal, he was free, and now his potential was indefinite.



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