

## C 程式設計題

命題者：ZZY

題目名稱(中文/英文)：Compute the square root

主要測試觀念：浮點數之運算與判斷是否相等

Basics	Decision and Loops	Functions
<input type="checkbox"/> Keywords and Identifier <input type="checkbox"/> Variables and Constants <input checked="" type="checkbox"/> Programming Data Types <input checked="" type="checkbox"/> Expressions <input type="checkbox"/> Basic Input/Output <input type="checkbox"/> Programming Operators	<input type="checkbox"/> Programming if...else <input checked="" type="checkbox"/> Programming for Loops <input checked="" type="checkbox"/> do...while Loops <input type="checkbox"/> break and continue <input type="checkbox"/> switch...case Statement <input type="checkbox"/> Programming goto	<input type="checkbox"/> User-defined Functions <input type="checkbox"/> Function Types <input type="checkbox"/> Programming recursion <input type="checkbox"/> Storage Class (variable life)
Arrays and Strings	Pointers	Structure and Union
<input type="checkbox"/> Arrays <input type="checkbox"/> Multi-dimensional Arrays <input type="checkbox"/> Arrays and Functions <input type="checkbox"/> Strings and Functions	<input type="checkbox"/> Pointers And Arrays <input type="checkbox"/> Pointers And Functions <input type="checkbox"/> Dynamic Memory Allocations	<input type="checkbox"/> Structures and Pointers <input type="checkbox"/> Structure and Function <input type="checkbox"/> Programming Unions
Files I/O	Miscellaneous	Other
<input type="checkbox"/> Files Input/Output basics <input type="checkbox"/> Character I/O and String I/O <input type="checkbox"/> Block I/O <input type="checkbox"/> Advanced File I/O manipulations	<input type="checkbox"/> Enumeration <input type="checkbox"/> Preprocessor <input type="checkbox"/> Low level programming <input type="checkbox"/> Error handling <input type="checkbox"/> Standard/advanced library	<input type="checkbox"/> Programming logic training <input type="checkbox"/> Programming structure/design training <input type="checkbox"/> Localization issues <input type="checkbox"/> _____

**題目說明：**Write a program that uses Newton' s method to compute the square root of a positive floating-point number.

Let x be the number entered by the user. Newton' s method requires an initial guess y for the square root of x (we' ll use  $y = 1$ ). Successive guesses are found by computing the average of y and  $x/y$ . The following table shows how the square root of 3 would be found:

x	y	$x/y$	Average of y and $x/y$
3	1	3	2
3	2	1.5	1.75
3	1.75	1.171429	1.73214
3	1.73214	1.73196	1.73205
3	1.73205	1.73205	1.73205

Note that the values of y get progressively closer to the true square root of x. For greater accuracy, your program should use variables of type double rather than float. Have the program terminate when the absolute value of the difference between the old value of y and the new value of y is less than the product of .00001 and y. Hint: Call the *fabs* function to find the absolute value of a double. (You' ll need to include the `<math.h>` header at the beginning of your program in order to use *fabs*.)

輸入說明：例如，輸入 3

輸出說明：則輸出：Square root: 1.73205

I/O 範例：

	Sample Input	Sample Output
第一組測資與輸出	2	Square root: 1.41421
第二組	5	Square root: 2.23607
第三組	7	Square root: 2.64575
...		

附屬資料：

☒ 解答程式：ComputeSquareRoot.c(檔名)

☒ 測試資料：input.txt, output.txt

■ 易，僅需用到基礎程式設計語法與結構（如單迴圈等）

☐ 中，需用到多項程式設計語法與結構（如雙層迴圈等）

☐ 難，需用到多項程式結構或較為複雜之資料型態或結構（如遞迴、串連等）

解題時間：5 分鐘。

其他註記：