

## Question 1

What will be output by each of the following program segments in C-- and/or C++?

- (i) `double a = 15;  
double b = 15;  
cout << 3/4*b << " ";  
cout << a/4 << endl;`
- (ii) `double a = 6;  
double b = 10;  
do {  
 b = b - a;  
 a = a - b;  
} while (a > 0);  
cout << a << " " << b << endl;`
- (iii) `double a = 3;  
double b = 6;  
while (a < 5 && b < 8) {  
 a = a + 2; b = b + 1;  
}  
  
cout << a << " " << b << endl;`

## Question 2

Write a program that reads in one value (you can assume that the value entered is a positive integer) and outputs all of the positive integers that are less than that number. Output values should be separated by spaces, and output in ascending order. The following sample run should give the idea. User inputs are in **bold**.

Enter one value: **12**

1 2 3 4 5 6 7 8 9 10 11

### Question 3

The following program gives a different output depending on the variable 'a':

```
if (a<0) {  
    cout << "value is negative";  
}  
if (a>=0 && a<6) {  
    cout << "value is small";  
}  
if (a>=6 && a <50) {  
    cout << "value is medium sized";  
}  
if (a>=50) {  
    cout << "value is large";  
}
```

Rewrite the code so that all of the "if" statements are replaced with a single "multi-way if", i.e. "if ... else if ...". Make the conditions used as concise as possible (avoid redundant tests).

### Question 4

Some or all of the code snippets below contain obvious programming errors. Identify the erroneous snippets and show how the errors could be corrected. Assume that all variables used have been declared (as being of type "double") and that all have been given values.

```
if (a = b) {  
    x == y;  
}
```

```
cout << "The discriminant is " << b^2-4ac << endl;
```

```
if (a||b||c==0) {  
    cout << "one value is zero" << endl;  
}
```

```
cin >> a  
while (a < 0) { // check to make sure input is valid
```

```
    cout << "Error, value cannot be negative" << endl;
}
```

### Question 5

i) A student is average if his/her mark is between 60 and 80 (inclusive of these values). Complete the "if" statement below. Assume that the student's mark is stored in a variable called *mark*.

```
if ( _____ ) {
    cout << "The student is average." << endl;
} // end if
```

ii) A car warranty is good for 5 years or 100,000 km (whichever comes first). Complete the "if" statement below. Assume that the number of years is stored in variable *years* and the number of kilometres in variable *kms*.

```
if ( _____ ) {
    cout << "The warranty has expired." << endl;
} // end if
```

iii) Assume three variables called *a*, *b*, and *c*. Looping is to continue as long as any two of these variables are zero. Complete the "while" statement below. Do NOT make use of C++'s implicit conversions between "int" and "bool" quantities.

```
while ( _____ ) {
    // do something or other
    ....
} // end if
```

### Question 6

The equation for a circle (at the origin) is  $x^2 + y^2 = r^2$  where *r* is the radius. A point (*x*,*y*) is inside the circle if  $x^2 + y^2 < r^2$ . Write a program that asks for an initial radius value. The radius must of course be larger than zero, and the program should keep asking for a radius until an appropriate value is entered. The program then repeatedly asks for two coordinates *x* and *y*, until 0 0 is entered. After accepting each coordinate pair, the program determines if the point is in the

circle, and displays an appropriate message. After 0 0 is entered, the program displays the proportion of the points entered that were inside the circle.

Sample run:

Please enter a radius: **5**

Please enter a coordinate pair ( 0 0 to stop): **1 1**

Point is inside the circle.

Please enter a coordinate pair ( 0 0 to stop): **1 4**

Point is inside the circle.

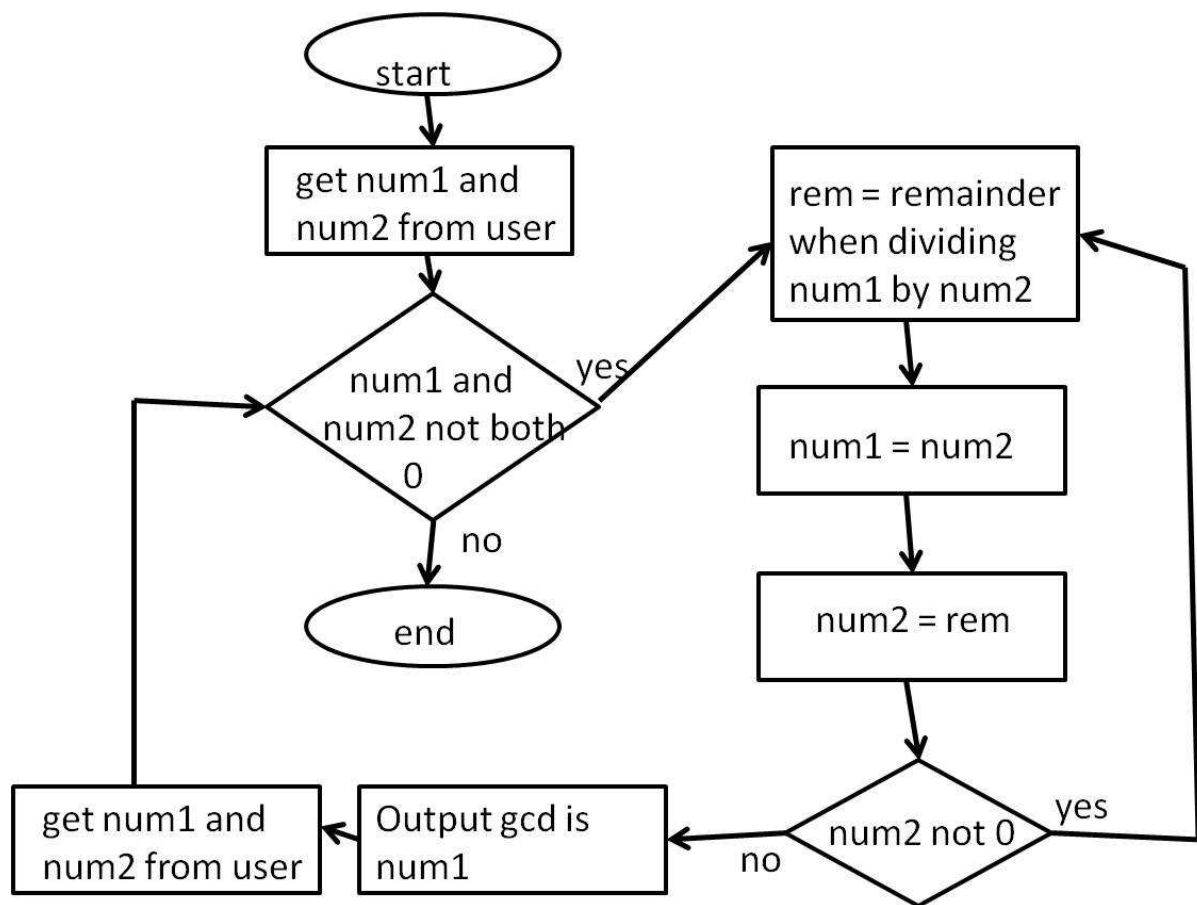
Please enter a coordinate pair ( 0 0 to stop): **3 4**

Point is not inside the circle.

Please enter a coordinate pair ( 0 0 to stop): **0 0**

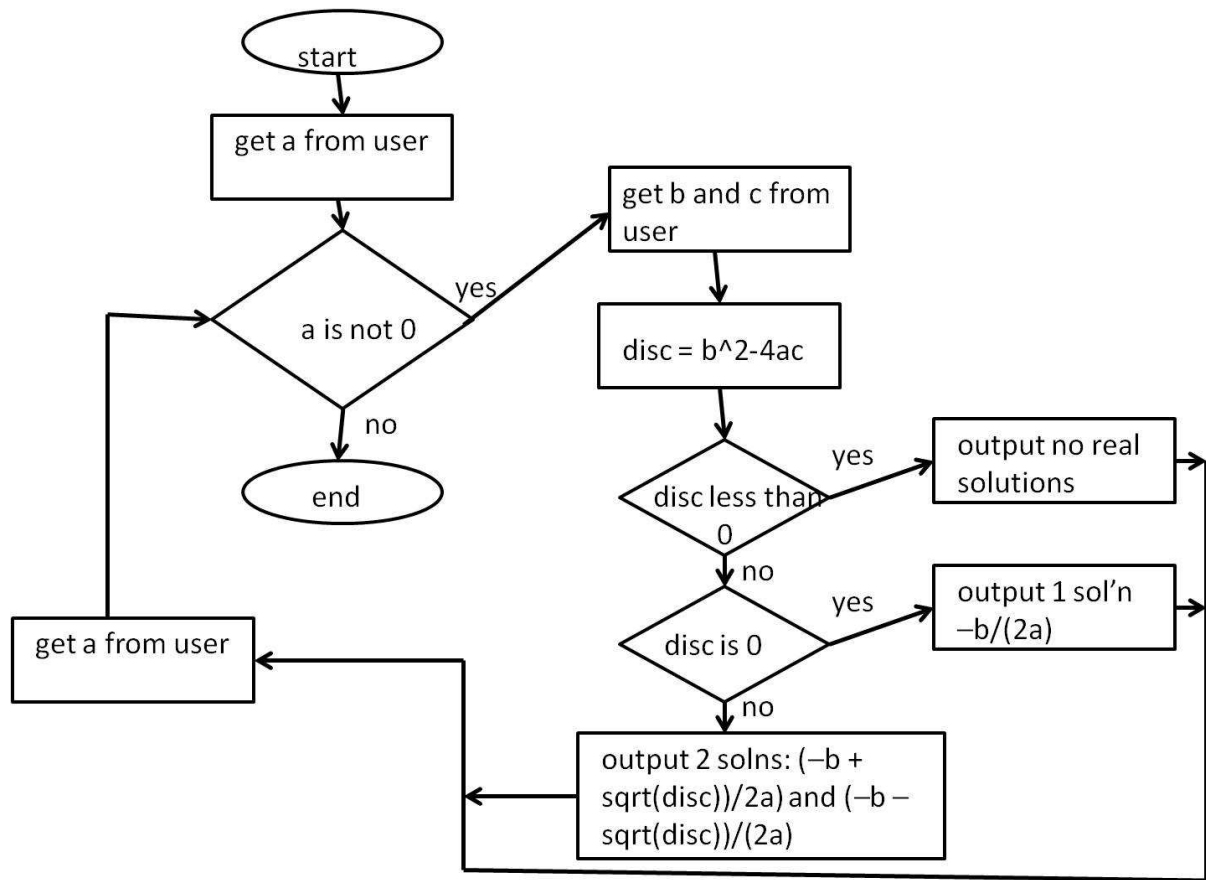
Proportion of points inside the circle was 0.666667

### Question 7



- Give the output if the user input is: 6 9 10 25 0 0.
- Write the C--/C++ code corresponding exactly to the flow chart.

### Question 8



- Give the output if the user input is: 1 1 1 2 4 2 0.
- Write the C--/C++ code corresponding exactly to the flow chart.