

The American University in Cairo
Department of Computer Science & Engineering
CSCE 106-07&09

Dr. KHALIL	Quiz-II	Fall 2011
Last Name :		ID:
First Name:		Form – I

EXAMINATION INSTRUCTIONS

- * Do not turn this page until asked to do so.
- * Exam time is **40** minutes.
- * Put the answers on the same question sheet, do not use any additional papers, even for scratch.
- * Write your name, ID, section no. in the indicated places.
- * Read the exam instructions.
- * Read the honesty policy.
- * Sign the following statement.

Academic Integrity Policy

Cheating in Exams is a violation of the Academic Integrity policy of AUC. Whispering, talking, looking at someone else's paper, or copying from any source is considered cheating. Any one who does any of these actions or her/his answers indicates that she/he did any of them, will receive a punishment ranging from zero in this exam to failing the course. If repeated, it may lead to dismissal from AUC.

I have read the honesty policy and exam instructions and I am presenting this exam as entirely my effort.

Signature: _____

DO NOT USE THIS SECTION

Question	Points	Grade
1	15	
2	10	
3	15	
4	10	
Total	50	

Question 1 (15 points)

Trace the following C++ program; i.e., show the effect of each numbered statement using the given table.

```
#include <iostream>
#include <cmath>
using namespace std;

void main () {
    float a = 1.5, b = 4.0, c;           // statement 1
    int x = 5, y = 3.5, z, s, t;         // statement 2
    const int two = 2;                   // statement 3
    c = (x + y) / x * a;                  // statement 4
    z = y % x + sqrt(b);                  // statement 5

    if (x % y == 0)
        s = (two * b + pow(x, y)) / (two * b); // statement 6
    else
        s = (two * b + pow(y, two)) / (two * b); // statement 7

    t = y / x * a + two * pow(two, y);     // statement 8

    cout << "The value of z = " << z << endl; // statement 9
    cout << "The value of c = " << c << endl; // statement 10
    cout << "The value of s = " << s << endl; // statement 11
    cout << "The value of t = " << t << endl; // statement 12
}
```

Use the following table to trace the given program (i.e., to plot the value of different variables as instructions are executed one after the other and finally showing the output).

Statement Number	a	b	c	x	y	z	s	t
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Question 2 (10 points)

Draw a Flowchart for the following C++ program::

```
#include <iostream>
using namespace std;

void main()
{
    int a, b, c, d, num;
    cin >> a >> b >> c >> d;
    num = d;
    if ( a > num )
        num = a;
    if ( b > num )
        num = b;
    if ( c > num )
        num = c;
    cout << num << endl;
}
```

The Flowchart

Question 3 (15 points)

In an experiment, a distance is measured as a large integer number of centimeters (cm). Write a complete C++ program that reads the distance (in cm) and display it in kilometers (km), meters (mm) and centimeters (cm).

(Hint: 1km = 1000 m, 1m = 100 cm)

Be sure to use proper formatting and appropriate comments in your code. The output should be clearly labeled. Show the three phases of software development: the analysis, design (draw a Flow Chart), and implementation.

The Analysis

.....

.....

.....

.....

.....

.....

.....

.....

The Flow Chart

[illegible]

The Program

[illegible]

Question 4 (10 points)

The quadratic equation $ax^2 + bx + c = 0$ has two real roots if its discriminator ($b^2 - 4ac$) is greater or equal to zero. The following C++ program gets the three coefficients **a**, **b**, and **c**, computes and displays the two real roots (if any). It first gets and tests a value for the coefficient **a**. If this value is zero, the program displays an error message and terminates, otherwise it proceeds to get a value for the coefficient **b** and a value for the coefficient **c**. Next it computes and tests the discriminator **d** ($b^2 - 4ac$). If the discriminator **d** is negative, the program displays an error message "No Real Roots!!" and terminates, otherwise it proceeds to compute and display the two real roots **R1** and **R2** according to the following formulas:

$$R1 = (-b + \sqrt{b^2 - 4ac}) / 2a \quad \text{and} \quad R2 = (-b - \sqrt{b^2 - 4ac}) / 2a$$

There are some missings (represented by dots) in the given program. Complete these missings such that the program could be compiled and run correctly.

The Program

```
#include <iostream>
.....
using namespace std;

void main()
{
    float a, b, c, R1, R2, d;
    cout << "Enter a non-zero value for the coefficient a: ";
    cin >> a;

    if ( ..... )
    {
        cout << "Enter a value for the coefficient b: ";
        cin >> b;

        cout << "Enter a value for the coefficient c: ";
        cin >> c;

        .....

        if (d >= 0)
        {
            R1 = .....

            R2 = .....

            cout << "The first root = " << R1 << endl;
            cout << "The second root = " << R2 << endl;
        }
        else
            .....

    }

    else
        cout << "Error!!, a is Zero Value!!" << endl;
}
```

Good Luck