

The American University in Cairo
Department of Computer Science & Engineering
CSCE 106-03&04&09

Dr. KHALIL	Exam-I	Fall 2012
Last Name :		ID:
First Name:	Form – I	Section No. ()

EXAMINATION INSTRUCTIONS

- * Do not turn this page until asked to do so.
- * Exam time is **75** 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	30	
2	20	
3	20	
4	30	
Total	100	

Question 1 (30 points)

Show the output of the following program: (Put the final answer in the empty box opposite to the code.

Do your rough somewhere else)

```
float a = 2, b = 2, c = 1.5, z;  
int d = 4, e = 2.5, y;  
if ( e > 2 )  
    cout << "Error!!" << endl;  
else  
    { z = a * b - c + (e + 1) / d;  
      y = a * b - c + d / (e + 1);  
      cout << " y = " << y << endl;  
      cout << " z = " << z << endl;  
    }
```

```
# include <iostream>  
using namespace std;  
void main()  
{ int num = 101, d, s = 0;  
  const int ten = 10;  
  d = num % ten;  
  s = s + d;  
  num = num / ten;  
  d = num % ten;  
  s = s + 2 * d;  
  num = num / ten;  
  d = num % ten;  
  s = s + 4 * d;  
  d = num / ten;  
  s = s + 8 * d;  
  cout << "The final result = " << s << endl;  
}
```

```
# include <iostream>  
using namespace std;  
void main()  
{ int a = 5.5, b = 7.5, c = 2.5, t;  
  if ( b < a )  
    { t = a;  
      a = b;  
      b = t; }  
  if ( c < b )  
    { t = b;  
      b = c;  
      c = t; }  
  if ( b < a )  
    { t = a;  
      a = b;  
      b = t; }  
  cout << "a = " << a << endl;  
  cout << "b = " << b << endl;  
  cout << "c = " << c << endl;  
}
```

Question 2 (20 points)

Draw the Flowchart of each of the following programs and show the final output:

<pre># include <iostream> using namespace std; void main() { int a = 55.5, b = 33.25, c = 44.4, t, s; t = c; if (b < t) t = b; if (a < t) t = c; s = a + b + c - t; cout << "t = " << t << endl; cout << "s = " << s << endl; }</pre>	FlowChart
Program Output:	

<pre>int s = 75; char g; if (s < 0) cout << "Error!!"; else { if (s < 55) g = 'F'; else if (s < 65) g = 'D'; else if (s < 75) g = 'C'; else if (s < 85) g = 'B'; else g = 'A'; cout << "The Final Result = " << g << endl; }</pre>	
Program Output:	

Question 3 (20 points)

The quadratic equation $ax^2 + bx + c = 0$ has two real roots if its discriminator $d = b^2 - 4ac$ 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.

```
#include <iostream>
.....
using namespace std;
void main()
{
    float a, b, c, R1, R2, d; // d is the decriminator and equal to  $b^2 - 4ac$ 
    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 ( ..... )
        {
            .....

            R1 = .....
            R2 = .....

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

            .....
        }
        else
            cout << "There are no Real Roots!!" << endl;
    }

    else
        cout << "Error!! Coefficient a should not be Zero!!" << endl;
    system ("pause");
}
```

Question 4 (30 points)

Write a C++ program that computes and outputs volume of a cone and area of its base, given the diameter of its base and its height. The program should display an error message then terminate if the entered value for diameter or height is 0 or less. The formulas for computing the cone's base area and volume are:

$$\text{Area of base} = \pi \times \text{Radius}^2$$

Volume of cone = $\frac{1}{3} \times \pi \times \text{Radius}^2 \times \text{Height}$

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

[illegible]

The Flow Chart

[illegible]

[illegible]

Good Luck