

The American University in Cairo
Department of Computer Science & Engineering
CSCI 106-05&07

Dr. KHALIL	Exam-I	Spring 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	20	
2	15	
3	20	
4	20	
5	25	
Total	100	

Question 1 (20 points)

Show the output of the following program:

Program	Output
<pre># include <iostream> # include <iomanip> using namespace std; void main() { int num = 1110, 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; }</pre>	
<pre>float a = 2, b = 2, c = 1.5, x = 45.5678, z; int d = 4, e = 2.5, y; z = a * b - c + (e + 1) / d + 2.235; y = a * (b - c) + d / (e + 1); cout << "x = " << floor (x*100 + .5)/100 << endl; cout << " y = " << y << endl; cout << " z = " << floor(z*10 + .5)/10 << endl;</pre>	
<pre>int s = 72; char g; if (s < 0) Cout << "Error, Invalid s!!" << endl; 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>	

Question 2 (15 points)

Draw the Flowchart of the following program and show its final output:

<pre># include <iostream> using namespace std; void main() { int a = 55.5, b = 70.25, c = 35.4, t, s; t = a; if (b < t) t = b; if (c < t) t = c; s = a + b + c - t; cout << "t = " << t << endl; cout << "s = " << s << endl; }</pre>	FlowChart
Program Output	

Question 3 (20 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.

```
#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)
        {   if ( ..... )
            .....
                R1 = .....
                R2 = .....
            .....
        else
            .....
                R1 = .....
                R2 = R1;
            .....
            cout << "The first root = " << R1 << endl;
            cout << "The second root = " << R2 << endl;
        }
        else
            .....

    }

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

Draw a Flow chart and write a complete C++ program that asks the user to enter integer number greater than or equal to 0. The program has to check the entered number and if it is less than 0, it prints out an error message **Invalid Input**, otherwise if it is less than 10, write out the words **ONE DIGIT BIG!**, If it is between 10 and 99, write out the words **TWO DIGITS BIG!** and if the user's number is greater than 99, write out the phrase **TOO BIG NUMBER!.**

[illegible]

The Flow Chart

[illegible]

Question 5 (25 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 validate the user input to accept only values that are greater than 0 for both diameter and height and displaying an error message in each case of violating these conditions. The formulas for computing the cone's base area and volume are:

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

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

Print both computed values to the nearest tenth. 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