

The American University in Cairo
Department of Computer Science & Engineering
CSCI 106-05&09

Dr. KHALIL	Exam-I	Fall 2009
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	20	
3	10	
4	20	
5	30	
Total	100	

Question 1 (20 points)

- a. A result of **(CD)₁₆** was produced in an accumulator of 8-bit structure. Give the value of this result in decimal notation for each of the following cases:

--	--	--	--	--	--	--	--

1. The computer is performing its operations in two's complement integer format:

[illegible]

2. The computer is performing its operations in sign-magnitude integer format:

[illegible]

- b. Subtract **35** from **17** using 8-bit two's complement computation.

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- c. Perform the following conversion operations to the number systems indicated:

$$(1100)_{10} = (\quad)_2 = (\quad)_{16}$$

[illegible]

Question 2 (20 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 = 2.5;           // 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)                           // statement 6
        s = (two * b + pow(x, y)) / (two * b); // statement 7
    else
        s = (two * b + pow(y, two)) / (two * b); // statement 8

    t = y / x * a + two * pow(two, y);        // statement 9

    cout << "z = " << z << endl;             // statement 10
    cout << "c = " << c << endl;             // statement 11
    cout << "s = " << s << endl;             // statement 12
    cout << "t = " << t << endl;             // statement 13
}
```

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								
13								

Question 3 (10 points)

Draw the evaluation tree for the following expressions:

$$r = (-b + a * c) / (2 * a)$$

.....

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Question 4 (20 points)

The following C++ program takes a positive integer number less than 16 and displays its equivalent binary value. 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 ()
{ // Declaration
  int num, d8, d4, d2, d1, rem;
  const int eight = 8;
  .....;
  const int two = 2;
  // Input
  cout << "Enter a positive integer lest than 16: " << endl;
  cin >> num;
  // Processing
  d8 = .....;
  rem = .....;
  d4 = .....;
  rem = .....;
  d2 = .....;
  d1 = .....;
  // Output
  cout << "The Equivalent Binary: " << ..... << ..... << ..... << ..... << endl; }
```

Question 5 (30 points)

Solve (A) or (B)

(A)

Draw a Flow chart and write a complete C++ program that asks the user to enter integer number greater than or equal to 0 and less than 1000. The program has to check the entered number and 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 **THREE DIGITS BIG!**.

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.

(B)

In some computer applications, the birthdate of a person is represented as one integer number of six digits according to the format DDMMYY, where DD is the day, MM is the month, and YY is the year of birth. For example, the integer number 231185 is a birthdate of a person, where 23 is the day of his/her birth, 11 is the month, and 85 is the year.

Write a C++ program that takes the birthdate of a person as **one integer number** of six digits according to the previous format and outputs the day, month, and year of birth, each on a separate line.

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

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The Flow Chart

This image shows a full page of a document template designed for handwriting practice or as a guide for letter height. It consists of approximately 30 evenly spaced horizontal dotted lines running across the entire width of the page. There are no margins, text, or other markings present.

[illegible]

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