The American University in Cairo
Computer Science Department
CSCI 106

Dr. KHALIL
Exam-I
Fall 2007

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: __________________

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DO NOT USE THIS SECTION

<table>
<thead>
<tr>
<th>Question</th>
<th>Points</th>
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1
Trace the following C++ program; i.e., show the effect of each numbered statement using the given table.

```cpp
// Tracing Program
#include <iostream>
#include <iomanip>
#include <cmath>
using namespace std;

void main ()
{
    const float c1 = 4;  // statement 1
    float c2 = 2.75, s;  // statement 2
    int j, k, n, m;
    //
    n = sqrt(c1);        // statement 3
    c2 = (n + 3) / 6 + c2; // statement 4
    n = n + 2.5 * c1 + c2; // statement 5
    m = 3.75 + (n + 1)/c1; // statement 6
    j = n % m;            // statement 7
    k = m % n;            // statement 8
    if ( j != k )
        s = j + 2 * c2;  // statement 9
    else
        s = k - 2 * c2;  // statement 10
    //
    cout << "The value of j = "  << setw(4)  << j  << endl;  // statement 11
    cout << "The value of k = "  << setw(4)  << k  << endl;  // statement 12
    cout << "The value of m = "  << setw(4)  << m  << endl;  // statement 13
    cout << "The value of n = "  << setw(4)  << n  << endl;  // statement 14
    cout << "The value of s = "  << setw(4)  << s  << endl;  // statement 15
    cout << "The value of c2  = " << setw(4) << c2 << endl;  // statement 16
}
```

<table>
<thead>
<tr>
<th>Statement Number</th>
<th>m</th>
<th>j</th>
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**Question 2 (15 points)**

Draw the evaluation tree for the following expressions:

\[ X = a * - (a + b) / c \]

\[ t = (w + x / -z) - x / (\sqrt{w - 5} - y) \]
### Question 3 (10 points)

Show the output of the following program:

<table>
<thead>
<tr>
<th>Program</th>
<th>Output</th>
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<tbody>
<tr>
<td><code># include &lt;iostream&gt;</code> &lt;br&gt;<code># include &lt;iomanip&gt;</code> &lt;br&gt;<code>using namespace std;</code> &lt;br&gt;<code>void main()</code> &lt;br&gt;<code>{</code> &lt;br&gt;<code>  int num = 3579, d, s = 0;</code> &lt;br&gt;<code>  const int ten = 10;</code> &lt;br&gt;<code>  d = num % ten;</code> &lt;br&gt;<code>  s = s + d;</code> &lt;br&gt;<code>  num = num / ten;</code> &lt;br&gt;<code>  d = num % ten;</code> &lt;br&gt;<code>  s = s + d;</code> &lt;br&gt;<code>  num = num / ten;</code> &lt;br&gt;<code>  d = num % ten;</code> &lt;br&gt;<code>  s = s + d;</code> &lt;br&gt;<code>  d = num / ten;</code> &lt;br&gt;<code>  s = s + d;</code> &lt;br&gt;<code>  cout &lt;&lt; &quot;The result is &quot; &lt;&lt; setw(4) &lt;&lt; s &lt;&lt; endl;</code> &lt;br&gt;<code>}</code></td>
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Question 4 (25 points)
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 Program
Question 5 (25 points)
Write a C++ program that computes and outputs the volume of a cone and area of its base, given the diameter of its base and its height. The formulas for computing the cone's base area and volume are:

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

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

Print both 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

The Flow Chart