

**The American University in Cairo**  
*Computer Science & Engineering Department*  
**CSCE 106-08**

|                          |                |                    |
|--------------------------|----------------|--------------------|
| <b>Dr. KHALIL</b>        | <b>Exam II</b> | <b>Spring 2010</b> |
| <b>Last Name :</b> ..... |                | <b>ID:</b> .....   |
| <b>First Name:</b> ..... |                | <b>Form - I</b>    |

**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            | 15         |       |
| 4            | 10         |       |
| 5            | 20         |       |
| 6            | 20 + 10    |       |
| <b>Total</b> | <b>100</b> |       |

### Question 1 (20 points)

Show the output of each of the following program segments:

```
const int ten = 10;
int d;
int n = 27049;
do
{
    d = n % ten;
    cout << d;
    n /= ten;
} while (n != 0);
```

```
int x = 1, y = 2;
while (x < 3)
    y /= x++;
cout << "x = " << setw(3) << x << " " << "y = " << setw(3) << y << endl;
```

```
# include <iostream>
# include <iomanip>
using namespace std;
void main()
{
    int a = 5, b = 7, c = 3, t;
    do
    {
        if ( b > a )
        {
            t = a;
            a = b;
            b = t;
        }
        if ( c > b )
        {
            t = b;
            b = c;
            c = t;
        }
    } while (( b > a ) || ( c > b ));
    cout << "a = " << setw(3) << a << endl;
    cout << "b = " << setw(3) << b << endl;
    cout << "c = " << setw(3) << c << endl;
}
```

```
int x = 1, y = 1;
while (x < 4)
{
    y *= x++;
    cout << "x = " << setw(3) << x << "y = " << setw(3) << y << endl;
}
```

```
int x, y;
for (x = 5; x > 10; x *= 2)
    for (y = 3; y <= 5; y++)
        cout << setw(3) << x << setw(3) << y << endl;
cout << "The Final Value Is: " << setw(5) << x / 2 % y;
```

## Question 2 (15 points)

A Prime number is a positive integer number greater than 1 which is only divisible by itself (and eventually by 1). The first prime number is 2, and the next is 3, and so on. The following C++ program takes a positive integer number greater than 1 and less than 100 and prompts the user whether the entered number is prime or nonprime. 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 does not accept any integer number outside the given range (greater than 1 and less than 100).

### The Program

```
#include <iostream>
#include <iomanip>
using namespace std;
void main ()
{ int num, c;
  bool flag;
  do
  {
    cout << "Enter a positive integer greater than 1 and less than 100: " << endl;
    cin >> num;
  } while (.....);
  .....;
  .....;
  while ( ..... )
    if ( ..... )
      .....;
    else
      .....;

  if ( ..... )
    cout << "The number  " << setw(4) << num << "is Non Prime" << endl;
  else
    cout << "The number  " << setw(4) << num << "is prime" << endl;
}
```

### Question 3 (15 points)

Write a program that uses nested loops to produce the following output:

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 0 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 0 | 0 | 3 | 4 | 5 | 6 | 7 | 8 |
| 0 | 0 | 0 | 4 | 5 | 6 | 7 | 8 |
| 0 | 0 | 0 | 0 | 5 | 6 | 7 | 8 |
| 0 | 0 | 0 | 0 | 0 | 6 | 7 | 8 |
| 0 | 0 | 0 | 0 | 0 | 0 | 7 | 8 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |

### **Question 4 (10 points)**

Write a C++ program to print all the positive integers that are divisible by 6 but not divisible by 9 in the range 1 to 2000 (inclusive).

4

In a laboratory experiment, readings of certain measurement are entered instantaneously to a computer one after the other for processing. Write a C++ program that accepts these readings and computes their average value at the end of the experiment. The program reads one reading value every execution of an input operation (cin) but accepts only positive values to compute the average value and discards all negative values. At the end of the experiment, the sentinel value 1111 is entered as an input to the program to stop processing and display the results. The sentinel value should not be considered as one of the valid or invalid readings. **The displayed results should include the average value of all valid readings, the number of all valid readings, and the number of invalid readings.** Use proper formats to display the results.

## This image shows a full page of a document template designed for handwritten notes or essays. It features approximately 30 evenly spaced, thin horizontal grey lines across the entire width of the page. The lines are uniform in thickness and color, providing a guide for writing without being distracting. There are no margins, headers, footers, or other markings present on the page.

A graduating student of AUC is awarded an honorary degree according to his/her final GPA. The honorary degree is granted according to the following rules:

| Final GPA           | Honorary Degree     |
|---------------------|---------------------|
| 3.80 <= GPA <= 4.00 | Highest Honors      |
| 3.60 <= GPA < 3.80  | High Honors         |
| 3.40 <= GPA < 3.60  | Honors              |
| 2.00 <= GPA < 3.40  | Pass with no Honors |

Draw a flow chart and write a program in C++ to input the GPA of a student and print out his/her honorary degree. **Show the three phases of software development: the analysis, design, and implementation. Implement your solution in C++ using nested-if structure. As a bonus (10 points), give the equivalent implementation using the switch structure. Enforce validation on the input GPA such that it is not less than 2.00 and not greater than 4.00**

## The Analysis

[illegible]

## The Flow Chart

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

### The Program Using nested-if structure

[illegible]

The Program Using switch structure (Bonus)

*Good Luck*