

The American University in Cairo
Computer Science & Engineering Department
CSCE 106 “Fundamentals of Computer Science”

Instructor: Dr. Khalil	Final Exam	Fall 2012
Last Name :		ID:
First Name: Form I Section No.: (04)		

EXAMINATION INSTRUCTIONS

- * Do not turn this page until asked to do so.
- * Exam time is **120** 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 honesty 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	10	
2	30	
3	10	
4	20	
5	30	
Total	100	

Question 1 (10 points)

Tick only one possible answer for each of the following:

- 1) The Boolean expression $!(x > y)$ can be simplified into:
- a. $(x < y)$ ☐
 - b. $(x \geq y)$ ☐
 - c. True ☐
 - d. none of the above ☐
- 2) **Intellectual Property:**
- a. A form of protection that can be granted by the government for an invention; gives exclusive rights of an invention to its inventor for 20 years. ☐
 - b. Standards of moral conduct as they relate to computer use. ☐
 - c. The rights to which creators of original creative works (such as software, artistic, literary works, inventions, and more) are entitled. ☐
 - d. The legal right to sell, publish, or distribute an original software, artistic or literary work; is held by the creator of a work as soon as it exists in physical form. ☐
- 3) The value of $((x - 4) != 4) \&\& ((x - 4) == 4)$ is:
- a. $(x - 4)$ ☐
 - b. False ☐
 - c. $(x + 4)$ ☐
 - d. none of the above ☐
- 4) The **Compiler** is a software that:
- a. translates a high-level language program into machine language ☐
 - b. translates an assembly language program into machine language ☐
 - c. lets users display and view a web document ☐
 - d. None of the above ☐
- 5) Suppose that x is an int variable that contains the value **2** and y is an int variable that contains the value **5**, the new value of x after the execution of $x += 2 * y$; will be
- a. 1 ☐
 - b. 12 ☐
 - c. 10 ☐
 - d. None of the above ☐
- 6) The **ALU** is the unit of computer responsible of:
- a. Storing programs and data permanently ☐
 - b. Performing arithmetic and logical operations ☐
 - c. Performing Input/Output operations ☐
 - d. None of the above ☐
- 7) The value of $((x \leq y) \parallel \text{True})$ is:
- b. $(x > y)$ ☐
 - c. $(x \leq y)$ ☐
 - d. False ☐
 - d. none of the above ☐
- 8) In C++, the statement: **if (1 == 1) cout << 1; else cout << 0;** will produce:
- c. 0 ☐
 - d. $(1 != 1)$ ☐
 - e. 1 ☐
 - d. none of the above ☐
- 9) $(110)_{10} + (110)_2$ is equivalent to:
- a. $(220)_{10}$ ☐
 - b. $(1110100)_2$ ☐
 - c. $(1100)_2$ ☐
 - d. None of the above ☐
- 10) A computer crime in which a person's social security number is taken is called:
- d. Hacking ☐
 - e. Identity theft ☐
 - f. E-harassment ☐
 - d. Social re-engineering ☐

Question 2 (30 points)

Show the output of each of the following program segments:

<pre>void drawLine(char); int func(int); void main () { drawLine('#'); cout << setw(3) << "k" << setw(8) << "func(k)" << endl; drawLine('-'); for (int k=0; k <= 5; k += 2) cout << setw(3) << k << setw(8) << func(k) << endl; drawLine('#'); } int func(int n) { int f = 1; for (int m=2; m <= n; m++) f = m * f; return f; } void drawLine(char ss) { for (int c = 1; c <= 10; c++) cout << ss; cout << endl; }</pre>	
<pre>float a = 3, b = 2, c = 1.5, x; int d = 4, e = 6.5, y; x = a * b - c + ++d / e++; y = a * (b - c) + e / --d; cout << " x = " << setw(4) << x << endl; cout << " y = " << setw(4) << y << endl; a = 3.3456; b = 5.9876; cout << setprecision(2); cout << setw(4) << a << setprecision(1) << setw(4) << b << endl; cout << setprecision(0) << setw(4) << a << setw(4) << b << endl;</pre>	
<pre>int B[4], n = 36, c = 0; cout << "The equivalent value of " << n << " is "; do { B[c] = n % 2; n = n / 2; c++; } while (n != 0); for (int k = c-1; k >= 0; k--) cout << B[k]; cout << endl;</pre>	

<pre> for (int c = 2; c < 4; c++) { for (int k = c; k <= 3 * c; k += c) switch (k % 3) { case 0: cout << setw(3) << "Zero"; break; case 1: cout << setw(3) << "One"; break; default: cout << setw(3) << "Two"; } cout << endl; } </pre>	
---	--

<pre> void swap (int&, int&); void main() { int a = 6.5, b = 5.3, c = 3.2; do { if (b < a) swap (a, b); if (c < b) swap (b, c); } while ((b < a) (c < b)); cout << "The Final value is:" << endl; cout << setw(4) << (b + c) / 2 << endl; } void swap (int& X, int& Y) { int T = X; X = Y; Y = T; } </pre>	
--	--

<pre> int a = .., b = .., c = ..; // a, b, and c are assigned some values if ((a > b) && false) cout << "It is the first case!!" << endl; else if ((b == c) && (b != c)) cout << "It is the second case!!" << endl; else cout << "It is the third case!!" << endl; </pre>	
--	--

<pre> string student; student = "Khaled"; cout << student.length() << endl; cout << student.find('e') << endl; </pre>	
---	--

Question 3 (10 points)

Draw a Flow Chart for the following C++ main function:

```
void main()
{
    int c_yes = 0;
    int c_no = 0;
    char vote;
    cout << "To exit press Q" << endl;
    cout << "Do you accept the constitutional draft?" << endl;
    cin >> vote;
    while (( vote != 'q' ) && ( vote != 'Q' ))
    {
        if ( vote == 'Y' ) || (vote == 'y' ))
            c_yes++;
        else
            if ( vote == 'N' || (vote == 'n' ) )
                c_no++;
        cin >> vote;
    }
    cout << "The number of Yes votes = " << c_yes << endl;
    cout << "The number No votes = " << c_no << endl;
}
```

Flow Chart

Question 4 (20 points)

Write a program that reads a positive integer (between 0 and 99999) from the user. The program then takes a single digit (from 0 to 9) from the user. The program will then call the function **exists** that takes the positive integer and the digit and returns the number of occurrences of the digit in the previously entered positive number. All data entry validations are required.

(Example: if the user enters 27817, then enters 7, the program will display:

The number of occurrences of 7 in 27817 is 2)

The Program

```
# include <iostream>
using namespace std;
int exists(int, int);
void main ()
{ int num, n;
  do
  { cout << "Enter an integer number between 0 and 99999:" << endl;
    cin >> num;
  } while ( .....);
  do
  { cout << "Enter an integer digit between 0 and 9:" << endl;
    cin >> n;
  } while ( .....);

  cout << "The number of occurrences of " << n << " in " << num << " is "<<
  ..... << endl;
}
..... (..... m , ..... d)
{ int count = .....;
  do
  {
    If ( m % 10 == ..... )
      .....;
    M = m / 10;
  } while (.....);
  return (.....);
}
```

Question 5 (30 points)

One interesting application of computers is the drawing of graphs and bar charts (sometimes called “histograms”). Write **a modular program** that performs the following:

- Take a user input representing a number of positive integer values (**n**) that the program will process. This number (**n**) should be greater than **0** and not more than **20**.
- Draw a header for the results, as shown in the example below.
- Take each positive integer value one by one to print a line containing the read value (on two positions), followed by a space and then a number of adjacent ‘#’s equal to the integer read value. Each entered integer value should be greater than 0 and not more than 15.
- Print a footer showing some statistical results: the average of the (**n**) entered values (rounded to the nearest integer), the highest value, the lowest value, and the number of values below 5.

The following is just **an example** of the program output for **n = 10** and the values entered one by one for processing are **5, 10, 2, 7, 7, 15, 9, 3, 12, and 2**.

=====

Number of Values: 10

Results:

```
5 #####
10 #####
2 ##
7 #####
7 #####
15 #####
9 #####
3 ###
12 #####
2 ##
```

Average = 7

Highest Value = 15

Lowest Value = 2

Number of Values Below 5 = 3

=====

Hints:

- Define functions to draw header and footer.
- Define a function that takes as an input an integer value and prints out its line. (the integer value itself on two positions, followed by a space and then its corresponding number of ‘#’s.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Lined area for writing, consisting of multiple horizontal dotted lines.

Good Luck