



## Question 1:

(12 Marks)

A. Determine the output for each of the following code snippets (assuming successful compilation): (8 Marks)

a) (2 Mark)	b) (2 Mark)
<pre># include &lt;iostream&gt; void draw_line ( void ) ; void main ( ) { draw_line(); draw_line ( ); cout &lt;&lt; "Welcome " &lt;&lt; endl; draw_line ( ) ; cout &lt;&lt; " First Year " ; draw_line ( ) ; draw_line ( ) ; } void draw_line ( void ) { for ( int i = 0 ; i &lt; 3 ; i ++ ) { cout &lt;&lt; " * " ; } cout &lt;&lt; endl ; }</pre>	<pre># include &lt;iostream&gt; int number = 100 ; void display (void); void main ( ) { int number = 200; cout &lt;&lt; " The value of the number is " &lt;&lt; number &lt;&lt; endl ; display ( ) ; } void display ( void ) { cout &lt;&lt; " The value of the number now is " &lt;&lt; number ; }</pre>
c) (2 Mark)	d) (2 Mark)
<pre>#include &lt;iostream&gt; int boxVolume ( int length = 1, int width = 1, int height = 2 );  int main( ) { cout &lt;&lt; "The default box volume is: " &lt;&lt; boxVolume( 10 ); return 0; } int boxVolume ( int length, int width, int height ) { return length * width * height; }</pre>	<pre>#include &lt;iostream&gt; int main ( ) {  int f1 = 1; int f2 = 1; for (int i = 1; i &lt;= 5; i += 1) { cout &lt;&lt; f1 &lt;&lt; endl; f2 = f1 + f2; f1 = f2 - f1; } }</pre>

B. Write for loops that will print the following patterns: (4 Marks)

a) (2 Mark)	b) (2 Mark)
<pre>***** ***** ***** *****</pre>	<pre>1 1 2 1 2 3 1 2 3 4</pre>



## Answer:

A.

a) (2 Mark)	b) (2 Mark)
<pre> **** **** Welcome **** First Year **** **** </pre>	<p>The value of the number is 200  The value of the number now is 100</p>
c) (2 Mark)	d) (2 Mark)
<p>The default box volume is: 20</p>	<p>1  1  2  3  5</p>

B.

a) (2 Mark)	b) (2 Mark)
<pre> #include &lt;iostream&gt; int main() { for (int i = 1; i&lt;=4; i++) {     for(int j=1; j&lt;=6; j++) {          cout&lt;&lt;"*";     }     cout&lt;&lt;endl; } return 0; } </pre>	<pre> #include &lt;iostream&gt; int main() { for (int i = 1; i&lt;=4; i++) {     for(int j=1; j&lt;=i; j++) {          cout&lt;&lt;j;     }     cout&lt;&lt;endl; } return 0; } </pre>

## Question 2:

(7 Marks)

1. The purpose of using a loop is to.....

- a. make decision  
b. declare variables  
c. repeat operation(s) many times  
d. declare constants

2. Which of the following is not a comparison operator in C++ language?

- a. >  
b. <=  
c. ==  
d. =



3. Which of the following is not a standard data type?

- a. int
- b. float
- c. date
- d. char

4. The force of gravitational attraction (F) of two bodies is given by a formula in which a constant (G) is multiplied by the product of the two masses (m1 and m2). This is then divided by the square of the distance (d) between the two bodies. Assuming these variables are declared, and have proper initial values where necessary, which of the following C++ statements correctly expresses this formula?

- a. F = G\*m1\*m2/(d\*d);
- b. G\*m1\*m2/d\*d
- c. F = = G\*m1\*m2/d^2;
- d. a or c is correct

5. char a='b'; char b='c'; char c=a; cout<<"a"<<b<<"c" <<a<<"b"<<c;  
The output of this program segment is:

- a. accbbb
- b. accabb
- c. abcabc
- d. None of the above

6. Which of the following is a correct declaration to a constant:

- a. const float X = 3.14;
- b. # define float X = 3.14;
- c. None of them
- d. float X 3.14;

7. Which of the following is a correct comment:

- a. None of them
- b. /\* This is a comment /\*
- c. /// This is a comment //
- d. /\*/ This is a comment

Benha University  
Faculty of Engineering (at Shoubra)  
Industrial Engineering Department  
Level "0"  
Spring Semester  
Attempt *all* the following questions:



**Final Exam**  
**Subject:** Computer Programming –  
CPE 101  
**Date:** Thursday 19/05/2016  
**Duration:** 3 hours  
**№ of Questions:** 5 in 3 page(s)  
**Total Mark:** 40

### Question 3:

(7 Marks)

Write a program that determines a student's grade. The program will read three types of scores (quiz, mid-term, and final scores) and determine the grade based on the following rules:

- if the average score  $\geq 90\%$  and  $\leq 100\%$   $\Rightarrow$  grade=A
- if the average score  $\geq 70\%$  and  $< 90\%$   $\Rightarrow$  grade=B
- if the average score  $\geq 50\%$  and  $< 70\%$   $\Rightarrow$  grade=C
- if the average score  $< 50\%$   $\Rightarrow$  grade=F

#### Answer:

```
#include <iostream>
int main( ) {
int Quiz, MidTerm, Final;
float Average;
cin>>Quiz; cin>>MidTerm; cin>>Final;
Average = (Quiz + MidTerm + Final) / 3;
if (Average>=0 && Average < 100)
    if (Average>= 90)
        cout<<"Your grade is A";
    else if (Average>= 70)
        cout<<"Your grade is B";
    else if (Average>= 50)
        cout<<"Your grade is C";
    else
        cout<<"Your grade is F";
else
    cout<<"Wrong degree";
    return 0;
}
```



## Question 4:

(7 Marks)

The factorial of a nonnegative integer is written as  $n!$  (pronounced “n factorial”) and is defined as follows:

$$n! = \begin{cases} n(n-1)(n-2) \dots \dots 1 & , n \geq 1 \\ 1 & , n = 0 \end{cases}$$

**For example:**  $5! = 5 * 4 * 3 * 2 * 1$ , which is 120.

Write a complete C++ program that accepts a nonnegative number and prints its factorial.

### Answer:

```
#include <iostream>
int main() {
int n, fact = 1 ;
cout << "Please enter a number" << endl ;
cin >> n ;
    while ( n > 0 ) {
        fact = fact * n ;
        n -- ;
    }
cout << "The factorial of your number is" << " " << fact ;
    return 0;
}
```

## Question 5:

(7 Marks)

A. Write a full program including two functions. The program should ask the user to enter a number, and decides if it is positive or negative and if it is odd or even. Use a function called OddEven to decide if the number is odd or even, and use another function called PositiveNegative to decide if it positive or negative. (5 Marks)

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**Answer:**

```
# include < iostream>
void OddEven ( int );           // Function declaration (prototype)
void PositiveNegative ( int );  // Function declaration (prototype)
void main ( ) {
int number ;
cout << " Please enter a number: " ;
cin >> number ;
OddEven ( number );           // Function call
PositiveNegative ( number );  // Function call
}
```

```
void OddEven ( int number ) {    // Function definition
if ( number % 2 == 0 )
cout << " your number is even " ;
else
cout << " your number is odd " ;
}
```

```
void PositiveNegative ( int number ) {    // Function definition
if ( number > 0 )
cout << " your number is positive " ;
else
cout << " your number is negative " ;
}
```

B. Complete the following sentences: (2 Marks)

1. Any C++ program has at least **one** function(s).
2. If  $X= 5$ , the value of the following expression:  $\text{sqrt}(X + 31)$  is **6**.
3. The value of the following expression:  $\text{power}(3, 2)$  is **9**.
4. The basic mathematical functions can be used in any C++ program by including a library called **cmath**.

*Good Luck*  
*Dr. Shady Yehia Elmashad*