



Benha University

2nd Term (May 2013) Final Exam

Class: 1st Year Students

Subject: structured Programming Basics



Faculty of Computers & Informatics

Date: 26-5-2013

Time: 3 Hours

Examiner: Dr. Mazen Selim

Answer the following questions:

Question 1:

(15 Marks)

- a) Rewrite the following code segment using a while loop instead of a for loop:

```
int i, data, sum=0 ;
for (i=1 ; i<=10 ; i++)
{ cout<<"\n Enter an integer : " ; cin>> data ;    sum +=data ; }
cout<<"\n Sum is : "<< sum<<endl;
```

- b) The following code is supposed to print the odd integers from 1 to 29. Find the errors in this code segment and rewrite the code after correcting them.

```
counter = 1 ;
do { counter += 1 ; cout << counter << endl ;
    } while ( counter <=29 )
```

- c) Suppose x=1, y=-1 and z=-1. What is the printout of the following:

```
if(x>0)
    if(y>0)        cout<<"x > 0 and y> 0";
    elseif (z>0)   cout<<" x <0 and z>0";
    else           cout<<" i don't know"
```

- d) What is the value of i after the for statement completed (1-100 2- 99 3-101 4- None)

```
n=100;
for(i=16; i <n; i +=5) {-----}
```

- e) What is the value of variable c

```
X=1;
Switch(x){
case(1) : c='A';
case(2) : c='B';
           cout<< " c = 5" ; break;
case(3) : c='C'; break;
Default: c='F';
}
```

Question2

(15 Marks)

Write a program which fills the diagonal of a matrix (square array) with 0, the lower left triangle with -1 and the upper right triangle with 1 as in figure to the right. The user should input the matrix dimension; Input should be between 3 and 6. If the input is outside the numeric range; the user should be prompted to enter a new value or zero to quit.

0	1	1	1	1	1
-1	0	1	1	1	1
-1	-1	0	1	1	1
-1	-1	-1	0	1	1
-1	-1	-1	-1	0	1
-1	-1	-1	-1	-1	0

Question3**(15 Marks)**

The function $\sin(x)$ can be calculated using the formula:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} - \dots x \text{ in radiance}$$

Write a program to calculate the value of $\sin(x)$, you have to stop terms addition when the term value is less than 10^{-6} .

- (a) Without using the functions. (b) Using the functions.

Question4**(15 Marks)**

Start with a program that has a structure named `part` which has 3 elements, `modelnumber`, `partnumber` and `cost`. In the main, the user has to input the values for an array of structure of 30 elements, after that the user has to pass that array of structures to a function called `maxcost()` that goes through the array, element by element, looking for the largest cost. The function should take as arguments the address of the array and the number of elements in it, and return the index number of the largest cost element. The program should call this function and then back to the main to display the structure elements having that index number.

Question 5**(15 Marks)**

An integer is said to be prime if it is divisible only by one and itself (For example 2,3,5,7,11), but 4,6,8, 10 are not. Write a program (main and a function), the main function asks the user to enter an integer number between (1 and 200), the program must check for this value, then the main sends that number to a function with a name **prime** that determines and print the number type. The program is terminating if the input is zero. Here is a sample of the output after running the program.

```
Enter an integer between 1 & 200 : 15
This number is not a prime number
Enter an integer between 1 & 200 : 37
This number is a prime number.
Enter an integer between 1 & 200 : 0
Program Termination
```

Question 6**(15 Marks)**

Imagine a tollbooth at a bridge. Cars passing by the booth are expected to pay a 50 cent toll. Mostly they do, but sometimes a car goes by without paying. The tollbooth keeps track of the number of cars that have gone by, and of the total amount of money collected. Model this tollbooth with a class called `tollBooth`. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the amount of money collected. A constructor initializes both of these to 0. A member function called `payingCar()` increments the car total and adds 0.50 to the cash total. Another function, called `nopayCar()`, increments the car total but adds nothing to the cash total. Finally, a member function called `display()` displays the two totals. Make appropriate member functions `const`.

Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the Esc key should cause the program to print out the total cars and total cash and then exit.

< Best Wishes >