Introduction to Computer Science-103

Quiz_4

1. Find how many times the *statement* in the following code segment in C is executed: (5%)

```
A = 5;
while (A<8)
{
        statement;
        A = A + 2 ;
}
```

The statement is executed twice (once when A = 5 and the second time when A = 7). When A becomes 9, the loop is terminated.

2. Write the code in Question 1 using a for loop. (5%)

```
for (int A = 5; A < 8;A = A + 2)
{
        statement;
}
```

3. Compare and contrast a procedural paradigm with an object-oriented paradigm. (10%)

   In the procedural paradigm, a program is an active agent that manipulates passive objects (data). In an object-oriented paradigm, data are designed as active objects. The action to be performed on these objects are included in the object.

4. According to the following program and the idea of basis path testing, determine the basis set of independent paths in a part of the following program. (10%)

   Path 1: 1 – 2 – 5 – 7
   Path 2: 1 – 2 – 5 – 6 – 7
   Path 3: 1 – 2 – 3 – 2 – 5 – 6 – 7
   Path 4: 1 – 2 – 3 – 4 – 2 – 5 – 6 – 7

```
void delete_element (int value, int array_size, int array[])
{
(1)   int i;
      location = array_size + 1;
(2)   for i = 1 to array_size {
(3)         if (array[i]==value){
(4)               location = i;
            }
      }
(5)   for i = location to array_size
      {
(6)         array[i] = array[i+1];
      }
(7)   array_size--;
}
```

5. Answer the following questions: (10%)

   a. Distinguish between coupling and cohesion.

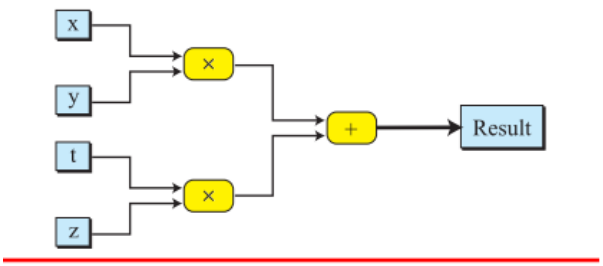
   b. Distinguish between the waterfall model and the incremental development model.

   a. Cohesion is a measure of how closely the processes in a program are related. Coupling is a measure of how tightly two modules are bound to each other.

   b. In the waterfall model, the development process flows in only one direction. This means that a phase cannot be started until the previous phase is completed. In the incremental model, the process is developed in a series of steps. The software group first completes a simplified version of the whole package. The version represents the entire package but does not include the details.

6. Show the data flow diagram for a simple mathematical formula $x \times y + z \times t$. (10%)

Figure P10.7 *Data flow diagram for* $(x \times y + t \times z)$



7. Distinguish between glass-box testing and black-box testing. (10%)

Glass-box testing is the testing of all of the functionality of a system and is the responsibility of the programmer. Black-box testing is the testing of a system with no knowledge of the program internal and is done by the system test engineer and the user.

8. What does the following code segment do? (10%)

```
int i, j, k;
for (i = 1; i <=2; i++) {
        for (j = 1; j <= 3; j++) {
                for (k = 1; k <= 4; k++)
                        printf("&") ;
                printf("\n") ;
      }
   printf("\n") ;
}
```

&&&&
&&&&
&&&&

&&&&
&&&&
&&&&

9. Change the following segment of code to use a *switch* statement: (10%)

```
if (A == 4)
{
      statement 1;
}
else if (A == 6)
{
      statement 2;
}
else if (A == 8)
{
      statement 3;
}
else
{
      statement 4;
```

```
switch (A)
{
   case 4: statement 1;
           break;
   case 6: statement 2;
           break;
   case 8: statement 3;
           break;
   default: statement 4;
           break;
}
```

10. An operator is a language-specific token that requires an action to be taken. The most familiar operators are drawn from mathematics. Identify the following operators to the three categories which they belong to. For example, "&&" is a logical operators . (10%)

++ , <= , + , != , ! , || , >= , * , –– , %

a. Arithmetic operators

b. Relational operators

c. Logical operators

a. ++, +, * , ––, %

b. <=, !=, >=

c. !, ||

11. The input data to a program is made up of a combination of three integers in the range 1000 to 1999 (inclusive). Find the number of exhaustive tests to test all combinations of these numbers. (5%)

$1000^3 = 10^9$

12. List the boundary-value tests required for the question 11. (5%)

The following shows the recommended boundary values.

First integer	Second integer	Third integer
1000	1000	1000
1000	1000	1999
1000	1999	1000
1000	1999	1999
1999	1000	1000
1999	1000	1999
1999	1999	1000
1999	1999	1999

13. What is the difference between pass-by-value and pass-by-reference? (5%)

Pass by value means use a copy of the original value stored in memory - ie allocate some more memory, copy the value in there and use that memory for the duration of the function. Thus, the original variable isn't affected by the function.

Pass by reference means use the actual memory storing the value - so if the function changes the value then the change is immediate and preserved when the function exits.

Passing by reference usually leads to faster program execution.