



THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Answer the following short questions:

(6+8+6+10=30)

1. [6 marks] Consider the following code.

```
#include <iostream>
using namespace std;
int main()
{
    int x = 4; int num = 0;
    while (x <= 18)
    {
        x *= 2;
        printf("%d ", x);
        if ((num++) % 2 == 1) continue;
        printf("%d ", x);
        printf("%d ", num);
    }
    return 0;
}
```

2. [4x2=8 marks] Consider the following code and memory map showing memory locations and address at the bottom of each memory cell.

```
#include <iostream>
using namespace std;
int main()
{
    int* p; int x = 7;
    p = &x;
    return 0;
}
```

Memory map for p:

- 1st row: value or contents of memory location,
- 2nd row: address of memory location

00AFF8BC	3
00AFF8C8	0

Memory map for x:

- 1st row: value or contents of memory location,
- 2nd row: address of memory location

7
00AFF8BC

What will be the output of the following lines of code? You are required to use the same memory addresses as shown in the map above otherwise ZERO will be granted.

- printf("p: %p \n", p);
- printf("p: %d \n", *p);
- printf("p: %p \n", &p);
- printf("x: %p \n", &x);

3. [3x2=6 marks] Consider the following code and memory map showing memory locations and address at the bottom of each memory cell.

```
#include <iostream>
using namespace std;
int main()
{
    int arr[4] = { 1,2,3,4 };
    int* p;
    p = arr;
    return 0;
}
```

Memory map for arr:

1st row: value or contents of memory location,

2nd row: address of memory location.

1	2	3	4
008FF9F4	008FF9F8	008FF9FC	008FFA00

Memory map for p:

1st row: value or contents of memory location,

2nd row: address of memory location

008FF9F4	1
008FF9E8	2

In continuation to the previous code, what will be the output of the following statements? You are required to use the same memory addresses as shown in map above otherwise ZERO will be granted.

- printf("p: %p\n" , p); 1
- printf("%p: %d\n" , *p); 1
- printf("%p: %p\n" , &p); 2

4. [10 marks] Declare and define a one dimensional dynamic array of integers A of size as mentioned by the user during input. Then declare a dynamic array of pointers B of same size as A. Make the cells of array B point to the respective cells of array A. That is, B[0] points to the memory location represented by A[0], B[1] points at A[1] and so on.

Q.2. Answer the following questions:

(3x10=30)

[10 marks] Part A

You are provided with file "dictionary.txt" consisting of a paragraph of text in English. Read the file and do the following tasks:

- Count no of words that have two A or a in them
- Count statistics for all alphabets i.e. how many words starting with AA, BB, CC,...,ZZ. Words may start from small letters as well, count both of them together. At the end display count of all and sum total

P.T.O.

[10 marks] Part B

Print the following pattern using at least two nested loops, otherwise ZERO will be granted.

1	2	3
2	4	6
3	6	9
.....		
2	3	4
4	6	8
6	9	12
.....		
3	4	5
6	8	10
9	12	15
.....		

[10 marks] Part C

Consider the following algorithm to generate a sequence of numbers. Start with an integer n . If n is even, divide by 2. If n is odd, multiply by 3 and add 1. Repeat this process with the new value of n , terminating when $n = 1$. For example, the following sequence of numbers will be generated for $n = 22$:

22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1

For an input n , the cycle-length of n is the number of numbers generated up to and including the 1. In the example above, the cycle length of 22 is 16. Given any two numbers i and j , you are to determine the maximum cycle length over all numbers between i and j , including both endpoints.

Input:

The input will consist of a series of pairs of integers i and j , one pair of integers per line. All integers will be less than 1,000,000 and greater than 0.

Output:

For each pair of input integers i and j , output i, j in the same order in which they appeared in the input and then the maximum cycle length for integers between and including i and j . These three numbers should be separated by one space, with all three numbers on one line and with one line of output for each line of input.

Sample Input:

1 10
100 200
201 210
900 1000

Sample Output

1 10 20
100 200 125
201 210 89
900 1000 174