b) Given the following series:

func(n) = (n-1) + (n-2) + (n-3) + (n-4)

i. Write a C++ program segment for the function `func()` that computes the total sequence of deduction numbers in the series.

(3 marks)

ii. Write a C++ program segment that calls the function for the value 10 and display the series as follows:

The function value for func(10) is 30

(3 marks)

b) Refer to the following array:

```
double number[5];
```

What is stored in `number` after the following C++ codes are executed?

```
for(int i=0; i<5; i++)
  number[i]= 3 + i;

for(int i=3; i>0; i--){
   if (i%2==0)
     number[i] = number[i*2] - number[i*3];
       else
     number[i] =number[i] / 2;
}
```

c) Given the information of total monthly sales for three products in a bookshop from January to March 2016. Each column represents Book, Magazine and Stationary respectively.

3000.00	3500.00	1850.00
3500.00	3200.00	1950.00
4000.00	3530.00	1880.00

Write C++ statements to:

i. Declare a two-dimensional array and initialize the array to store the information above.

(3 marks)

ii. Calculate the total sales for each month and display the output as the following:

BOOK	MAGAZINE	STATIONARY	TOTAL SALES
3000	3500	1850	8350
3500	3200	1950	8650
4000	3530	1880	9410

c) Given the information on the number of medals won by the top ten countries in the Olympics game. Each row consists of the number of gold, silver and bronze medal won.

46	28	29
38	29	21
29	17	19
22	25	32
13	8	7
11	19	14
11	11	12
8	17	12
8	9	11
8	4	6

Write C++ statements to:

i. Declare a two dimensional array and initialize the array to store the information above.

(2 marks)

ii. Count the total medal and display the content of each row as in the format shown below.

```
GOLD    SILVER   BRONZE   TOTAL
46      28       29       103
38      29       21       88
29      17       19       65
22      25       32       79
13      8        7        28
11      19       14       44
11      11       12       34
8       17       12       37
8       9        11       28
8       4        6        18
```

(5 marks)

iii. Find and display the highest number of bronze medals won.

(3 marks)

b) Write C++ codes for the following:

i. To define a function `FindIQLevel()` that receives the IQ scores and display the IQ level as the following table:

IQ Scores	IQ Level
<20	Slow
20 - 140	Normal
141 - 210	Intelligent
>210	Genius

(3 marks)

ii. To call the `FindIQLevel()` function and display the output as in the format below:

```
Student       IQ Level      Scores
1             Genius        300
2             Intelligent   145
3             Normal        25
Average Scores    156.7
```

(3 marks)

c) Determine the output for the following code:

```
#include <iostream>
using namespace std;

void square(int *x)
{
      *x = (*x + 1) * (*x);
}

int main()
{     int num = 10;
      square(&num);
      cout<<num;
      square(&num - 100);
      return 0;
}
```

(4 marks)

b) Determine the output of the following C++ program segment.

```
int main()
{     int k=10, j=20;
      int *p = &k;
      int *q = &j;
      cout << *p << " " << *q << endl;
      for (int i=0; i<2; i++)
            *p += *q + 5;
      cout << *p << " " << *q << endl;
      cout << k << " " << j << endl;
      return 0;
}
```

(4 marks)

b) Show the output of the following C++ program segment:

```
#include<iostream>
void test(int, int&);
int main()
{     int k = 8;
      test(4, k);
      cout << k << endl;
      return 0;
}

void test(int n1, int &n2)
{     int n3;
      n3 = n1 + n2 * 2;
      n2 = n2 + n3;
      cout << n1 << " " << n2 << " " << n3 << endl;
}
```

(3 marks)

b) State the output of the following C++ program segment.

```
int board[3][3] = {15, 25, 13, 20, 4, 7, 11, 18, 14};

for(int r=0; r<3; r++)
      board[r][2] = board[r][2] + 5;

for(int r=0; r<3; r++)
{
      for(int c=0; c<3; c++)
            cout << board[r][c];
      cout << endl;
}
```

(3 marks)

c) Write C++ statements to perform the following tasks:

i. Declare TWO (2) arrays. The first array has a `string` data type and is used to store the name of 3 students, and the second array has an `int` data type and is used to store 3 marks for each student.

(2 marks)

ii. Insert the names and marks for all students.

(3 marks)

iii. Display the names of each student along with their respective marks.

(2 marks)

b) Write the output of the following C++ code.

```
#include<iostream>

 int x=15,  y=7;
 void funOne(int &a, int &b);
 int main()
 { funOne(x, y);
   cout<<x + 1<<" "<<y + 2<<endl;
   funOne(x,y);
   cout<<x * 2<<" "<<y * 3<<endl;
   system("pause");
   return 0;
 }
 void funOne(int &a, int &b)
 { a = a + 20;
   b = a - 25;
   cout<<a<<" "<<b<<endl;
 }
```

(4 marks)

QUESTION 2

a) Write a function `calcSeries` to calculate a series of N numbers powered by 2.

Sample 1 : N = 4

$1^2 - 2^2 + 3^2 - 4^2 = -10$

Sample 2 : N = 7

$1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + 7^2 = 28$

(5 marks)

b) What is the output for the following program fragment?

```
int myArray[4][4];

for(int i=0; i<4; i++)
      for(int j=0; j<=4; j++)
      {
            if(i == 0)
                myArray[i][j] = j + 1;
            if(i > 0 && j == 0)
                myArray[i][j] == myArray[i-1][3]+1;
            else
                myArray[i][j] = myArray[i][j-1]+1;
      }

for(int i=0; i<4; i++)
{
      for(int j=0; j<4; j++)
            cout<<myArray[i][j]<<" ";
      cout<<endl;
}
```

(4 marks)