Q1 Write a high level program to evaluate the following series and then translate it into machine language suppose each character will be coded in five bits.

\[ \sum_{i=1}^{5} \sum_{j=1}^{4} i + 4j \]  

[20 marks]

Q2 Suppose you have the program.

```c++
#include <iostream.h>

int search(int a[], int y)
{
    int i=0;
    while (a[i] != y)
        i++;
    return(i);
}

int t, x, f;
void sort(int a[])
{
    int k1, k2;
    for(k1=0; k1 <= 8; k1++)
        for(k2=k1+1; k2 <= 9; k2++)
            if(a[k1] > a[k2])
                { t=a[k1];
                    a[k1]=a[k2];
                    a[k2]=t;
                }
    for(k1=0; k1 <= 9; k1++)
        cout << a[k1];

    cout << endl << "enter number to search for it";
    cin >> x;
    f = search(a, x);
    cout << "it found in location=" << f; } 

void main(void)
{ int b[10]={18,7,4,9,1,0,16,30,89,50};
    sort(b); }
```
Answer only one question:

a) Draw a diagram for execution state at start of subprogram search and determine CEP and CIP.
b) Trace the program into a diagram for program interpretation and execution and then determine the local and non local variables.

Q3 Convert the following code segment into flowchart

Read X
1 A=X/2
2 B=(X/A+A)/2
   C=B-A
   If C<0 then C=-C
   If C<10^{-6} then Goto 3
   A=B
   Goto 2
3 write B
   Stop
   End

Q4 Write a recursive algorithm and diagram for computing power (3^3).

Good luck