Tutorial 03

L05 - Loops and Conditional Statements

L06 – Time complexity

Exercise

- Write a program in MATLAB to read 10 numbers from keyboard and find their sum and average.

- Write a program in MATLAB to display the n terms of harmonic series and their sum.
- 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms
- *Expected Output* :
  >> **1/1 + 1/2 + 1/3 + 1/4 + 1/5 +**
  >> **Sum of Series upto 5 terms : 2.283334**

Anwer

- Write a program in MATLAB to read 10 numbers from keyboard and find their sum and average.
- ----------Script ----------
- for i=1:10
- X(i) = input('Enter a number');
- end
- disp('The average is=');
- mean(X)
- disp('The sum of TEN number is');
- sum(X)

Answer

- Write a program in MATLAB to display the n terms of harmonic series and their sum.
- 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms
- ---------- script ----------
- n=input('Enter the number of terms to be displayed of harmonic series');
- str ='';
- for i=1:n
- X(i) = 1/i;
- str = strcat(str,' ',num2str(1),'/',num2str(i),' + ');
- end
- disp('The harmonic series is ');
- str
- disp('The sum of harmonic series is');
- sum(X)

Exercise

- Write a program in MATLAB to print the Floyd's Triangle.
- 1
- 01
- 101
- 0101
- 10101

- Write a MATLAB program to keep asking for a number until you enter a negative number. At the end, print the sum of all entered numbers. **USE WHILE LOOP.**

Exercise

- Write a program in MATLAB to print the Floyd's Triangle.

```
clear all;clc;
n=5; flag=1;
for i=1:n
    str='';
   for j=1:i
       if(flag==1)
           str=strcat(str,'1');
           flag=0;
       else
           str=strcat(str,'0');
           flag=1;
       end
   end
   disp(str);
end
```

Answer

- Write a MATLAB program to keep asking for a number until you enter a negative number. At the end, print the sum of all entered numbers. **USE WHILE LOOP.**
- ---------- Script ----------

```
i=1;
while 1
    X(i)=input('Please enter a positive
number');
    if X(i)<0
        sum(X)
        return;
    end
    i=i+1;
end
```

Exercise

- Write a MATLAB code to search a given element in a sorted array.

- Find its time complexity T(n)?

- Hint : Use binary search

Time complexity : O(logn)

Problem reduces by HALF after each iteration

```
X=5;
A=[1 2 3 4 5 6 7 8 9 10];
low=1;hi=length(A);
while low<=hi
    mid = round((low+hi)/2);
    if(X==A(mid))
        mid  % array index
        return;
    elseif X<A(mid)
        hi=mid-1;
    else
        low=mid+1;
    end
end
```

Exercise

- Write a pseudocode algorithm (Iterative and Recursive) to reverse the contents of the array.
- Find the time complexity of the algorithm.

MATLAB commands for reversing an array : fliplr(A)
OR A(end:-1:1)

Iterative

O(n)

```
A=[1 2 3 4 5 6];
low=1;hi=length(A);
while(low<hi)
    temp = A(hi);
    temp2=A(low);
    A(hi)=temp2;
    A(low)=temp;
    hi=hi-1;
    low=low+1;
end
A
```

Recursive

O(n)

```
function A = recArrayRev(A,low,hi)
    if(low>=hi)
        return;
    end
    temp = A(hi);
    temp2=A(low);
    A(hi)=temp2;
    A(low)=temp;
    hi=hi-1;
    low=low+1;
    A=recArrayRev(A,low,hi);
end
```