LECTURE NOTES

FOR

CS101, Sc. 01

INCLUDING:

1. For Statement && star example
2. Summation Program versions 1 – 2 – 3 – 4.
3. do-while statement
4. Sample Problems

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FOR STATEMENT

n!=1*2*3*4.....n

n!= { 1 if n=0 ; n(n-1)! İf n>0 }

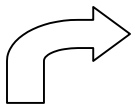
```
int n fact, i ,n;
nfact=1;
i=1;
while (i|<=n) {
   nfact=nfact * i;
    i=i+1;
  }
```

for(n fact=2, i=1 ; i<=n; i=i+1)

initilazation condition update

nfact=nfact*i; This one is the statement.

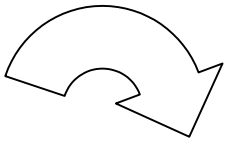
For(initilization; condition ;update)
Statement



```
initilization
while (condition) {
   Statement
   Update
}
```

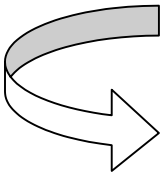
Find the sum of even numbers from 1 to n;

```
For (sum=0 , i=2 ; i<=n; i=i+2)
      {
         sum=sum+i
       }
```



or we can write it like this;

```
sum=0
 i=2
for(; i<=n; )  {
     sum=sum+i;
      i=i+2;
 }
```



If we write it with while;

```
Sum=0;
İ=2;
While(i<=n)
 {  sum=sum+i
    i=i+2
 }
```

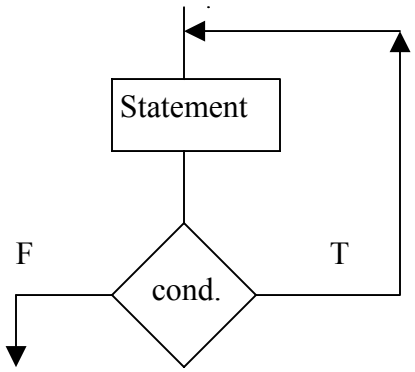
```
    *
   ***
  *****
 *******
*********
```

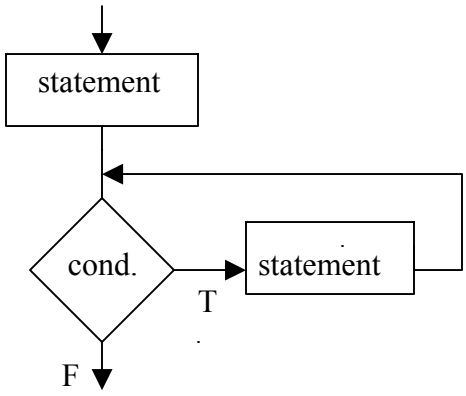
to write a program to make this shape we can use for loop;

```
for( line=1; line<=maxlines; line++)
        {  n=n-1
           for(i=1; i<=n; i++)
System.out.println(" ");
           For( k=1; k<=(2*line-1);k++)
         System.out.print("*");
 System.out.println( );
}
```

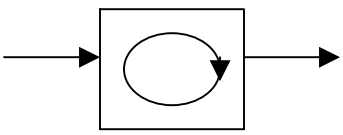
Another loop structure:

```
do
   statement
while (condition);
```





Loop structure :



sum= sum of the input numbers
  1 <= inputNo <= 100

stop when inputNo= 0

Truth table:

a	b	a && b
T	T	T
T	F	F
F	T	F
F	F	F

a= inputNo >= 1
b=inputNo <= 100

Notes for version 1:

sum = sum + inputNo;

```
a+ = b;
a= a+ b;
```

```
a % = b;
a = a % b;
```

Version 1:

```
import cs1.Keyboard;

public class class1

{

    public static void main (String args [ ] )

        {

           int inputNo, sum;

            sum= 0;

            System.out.println("Enter an integer between 1 and 100");

            inputNo= Keyboard.readInt();

            While (inputNo >= 1 && inputNo <= 100) {

               sum+ = inputNo;

               System.out.println("Enter an integer between 1 and 100");

               inputNo= Keyboard.readInt();
```

```
        }

        System.out.println("sum=" +sum);

    } // end of main

}  // end of class
```

VERSION 2

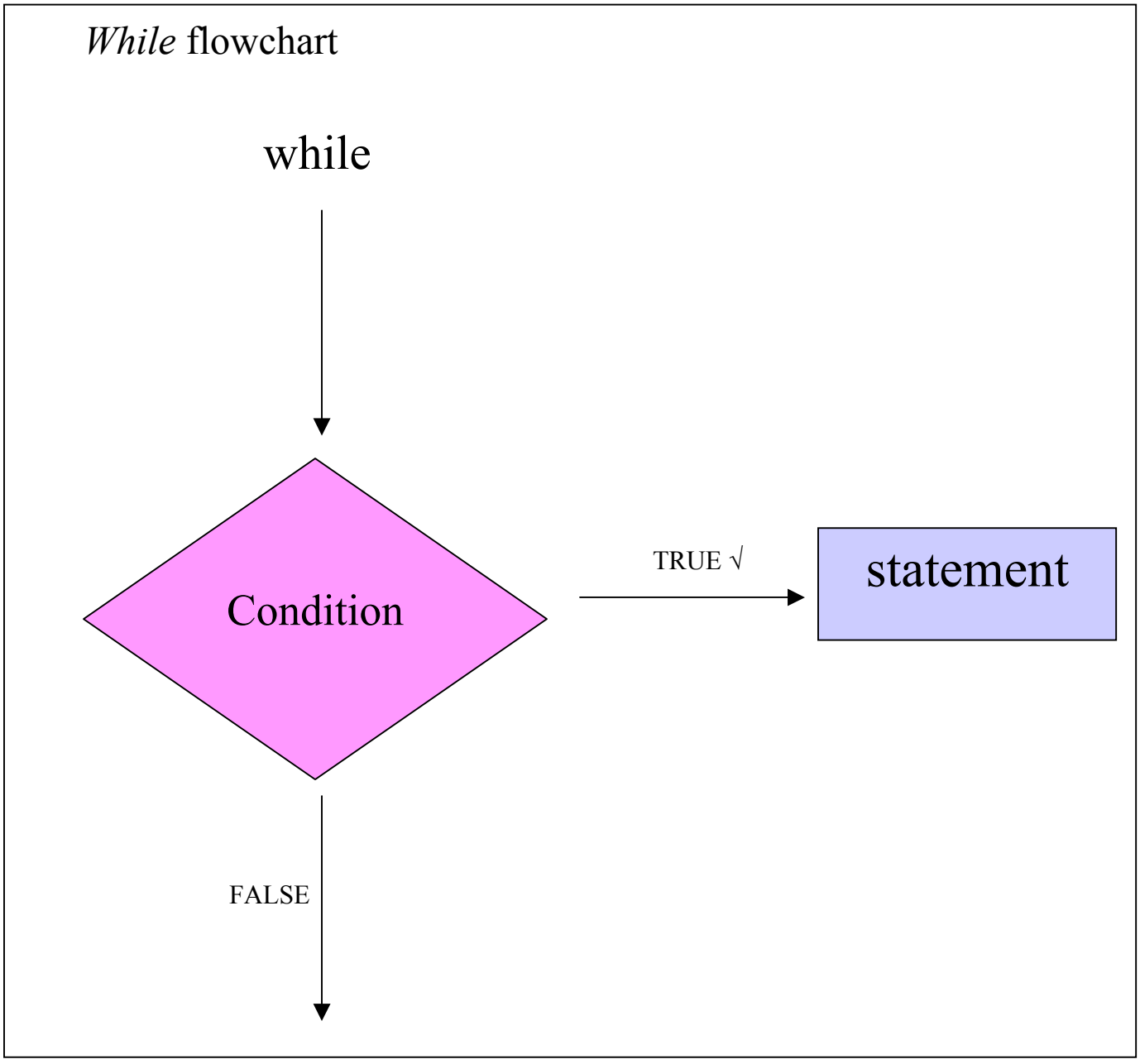
```
import cs1.Keyboard;
public class class1
{
    public static void main(String[]args)
    {
        boolean legalInput;
        int sum,inputNo;
        sum=0;

        System.out.println("Enter an integer between 1 and 100");
        inputNo=Keyboard.readInt( );

        legalInput=inputNo>=1&&inputNo<=100;
        while(legalInput= =true){
            sum=sum+inputNo;

        System.out.println("Enter an integer between 1 and 100");
        inputNo=Keyboard.readInt( );

        legalInput=inputNo>=1&&imputNo<=100;
    }

}
```

VERSION 3

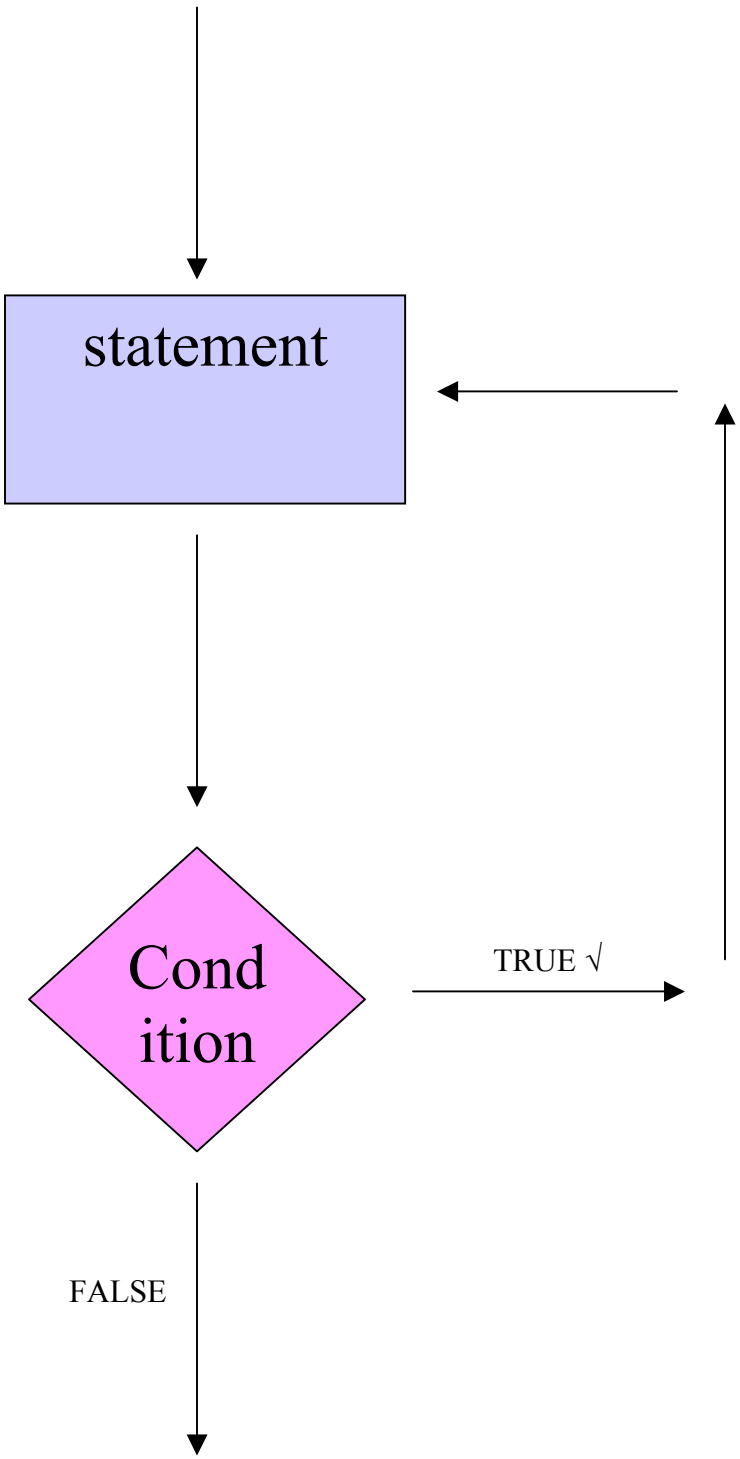
```
import cs1.Keyboard;
public class class1
{
    public static void main(String[]args)
    {
        boolean legalInput;
        int inptuNo,sum;

        System.out.println("Enter an integer between 1 and 100");
        inputNo=Keyboard.readInt( );

        for(sum=0,legalInput=inputNo>=1&&inputNo<=100;legalInput;){
            sum+=inputNo;

        System.out.println("Enter an integer between 1 and 100");
        inputNo=Keyboard.readInt( );

        legalInput=inputNo>=1&&inputNo<=100;
      }
        System.out.println("sum"+sum);
     }
 }
        for(sum=0,legalInput=inputNo>=1&&inputNo<=100;legalInput;
            legalInput=inputNo>=1&&inputNo<=100){
                sum+=inputNo;

            System.out.println("Enter an integer between 1 and 100");
            inputNo=Keyboard.readInt( );

          }
            System.out.println("sum:"+sum);
```

Q: Write a program that calculates the sum of odd numbers by using for statement
and boolean.

DO – WHILE STATEMENT



***do – while* flowchart**



The javacode for do – while

```
do {
        statement
}

while (cond);
```

Version # 4

```
input cs1.Keyboard;
public class class1 {
        public static void main(String[] args) {
                boolean legalInput;
                int sum=0, inputNo;

                do {
                        System.out.println ("Enter a integer between 1 and 100: ");
                        inputNo=Keyboard.readInt();
                        legalInput = inputNo >= 1 && inputNo <= 100;

                        if (legalInput)
                                sum += inputNo;
                }
                while (legalInput)
                        System.out.println ("sum: "+sum);
        }
}
```

switch Statement

problem: Write a program to count letter grades A, B, C, D, F. Quit when user enter x, for other inputs display error.

```
char letterGrade;
int aCount=0, bCount=0, cCount=0, dCount=0, fCount=0;
System.out.println ("Enter a letter grade (A...F) or enter x to quit");

letterGrade = Keyboard.readChar();
while (letterGrade != 'x') {
        switch (letterGrade) {
                case 'A':  aCount++;
                        break;
                case 'B':  bCount++;
                        break;
                case 'C':  cCount++;
                        break;
                case 'D':  dCount++;
                        break;
                case 'F':  fCount++;
                        break;
                default:  System.out.println ("Error");
        }
        System.out.println ("Enter a letter grade: ");
        LetterGrade = Keyboard.readChar();
}
System.out.println("A Counts: "+aCount +", B Counts: "+bCount);
System.out.println(", D Counts: "+dCount +", F Counts: "+fCount);
```

Sample Problems

Problem 1: (Hatice Çalık) Write a program to find the sum of the powers of 2 from 1 to n by using do while structure ($2^0 + 2^1 + 2^2 + \ldots\ldots\ldots + 2^a$ where $2^a <= n$).

Solution:

```
import cs1.Keyboard;
public class classes
  {
    public static void main (String[] args)
     {
       int n, i, sum;
       i= 1;
       sum= 0;
       System.out.println("Enter a positive integer n:");
       n= Keyboard.readInt( );

      do {
            sum = sum + i;
            i = i * 2;

           }
       while (i <= n) ;
        System.out.println("sum= +sum );
     } // end of main
  } // end of class
```

Problem 2: (Hatice Çalık) Write a program to find the value of the following summation:
1*2 + 2*3 + 3*4 +.....+ (n-1)*n

Solution:

```
import cs1.Keyboard;
 public class classes
  {
     public static void main (String[] args)
          {
             int sum, n, i;
             sum=0;
             i=1;
             System.out.println("Enter a positive integer n:");
             n= Keyboard.readInt();

             do {
                  sum = sum + i*(i + 1);
                  i = i + 1;
                }
              while ((i+1) <= n);
              System.out.println("sum=" +sum);
           }
   }
```

Problem 3: (Selin Güler) Compose a program that calculates the summation:

1 + 1/2! + 1/3! + ... + 1/n! = ?

(This program contains some errors. Left as is for exercise purposes. FC)

Solution:

```
public class Summation
{
        public static void main (String[] args)
        {
                double sum = 0, i;

                for (i=1 ; i<=10000 ; i++)
                {
                        sum = sum + (1/i);
                }

                System.out.println (" The sum so far is: ");
        }
}
```

Problem 4: (Selin Güler) Find the reverse of a number.

Solution:

```
import cs1.Keyboard;

public clas Reverse
{
        public static void main (String[] args)
        {
                int number, lastDigit, reverse=0;

                System.out.println("Enter a positive integer: ");
                number=Keyboard.readInt();

                do
                {
                        lastDigit = number%10;
                        reverse = (reverse*10) + lastDigit;
                        number = number / 10;
                }
                while (number>0);
                        System.out.println("That number reversed is " +reverse);
        }
}
```

Problem 5: (Selin Güler) Compose a program that finds the prime factors of an input int number. (This program contains some logic errors. Left as is for exercise purposes. FC)

Solution:

```
import cs1.Keyboard;
public class PrimeNumber
{
        public static void main (String[] args)
        {
                int number;
                System.out.println ("Enter a positive int to be factored (-1 to quit)");
                number = Keyboard.readInt( );

                if (number == -1)
                        System.out.println("quit");
                else
                        System.out.println("prime"+"       "+exponent");
                        System.out.println("*******          *******");

                for (int prime = 2 ; prime <= number ; prime ++)
                {
                        int exponent = 0;
                        while (number%prime == 0)
                        {
                                number = number%prime;
                                exponent ++;
                        }
                        System.out.println(prime + "                    "+exponent);
                 }
        }
}
```