```java
int n=7;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if((i==0)||(i==n-1)||j==(n-1)/2){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
  }
    System.out.println( );
}
//output:
*******
    *
    *
    *
    *
    *
*******
```

```java
int n=7;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if((i==(n-1)/2 && j>0 && j<(n-1)/2 )|| (j==0) || j==(n-1)/2){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
  }
    System.out.println( );
}
//output:
```

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

```java
int n=10;
    for(int i=0;i<n;i++) {
        for(int j=0;j<n;j++) {
            if(i==n-1 && j>=(n-1)/2 || j==n-1 && i>=(n-1)/2 || i+j>=(n-1)+(n-1)/2){
            System.out.print(s: "*");
            }
            else {
            System.out.print(s: " ");
            }
      }
        System.out.println( );
    }
/output:
/        *
/       **
/      ***
/     ****
/    *****
/   ******
```

```java
int n=10;
    for(int i=0;i<n;i++) {
        for(int j=0;j<n;j++) {
            if(i==0|| j==0 && i<(n-1)/2||i+j<=(n-1 )/2 || j-i>= (n-1)/2 ||
             j==n-1 && i<(n-1)/2 || j==0 && i>(n-1)/2 || i==n-1 && j<(n-1)/2 ||
             i-j>=(n-1)/2 ){
            System.out.print(s: "*");
            }
            else {
            System.out.print(s: " ");
            }
      }
        System.out.println( );
    }
//output
//          **********
//          **** *****
//          ***   ****
//          **     ***
//          *       **
//          **       *
//          ***
//          ****
//          *****
//          ******
```

```java
        int n=11;
        for(int i=0;i<n;i++) {
            for(int j=0;j<n;j++) {
                if((i==n/4 && j>n/4 && j<(3*n)/4) || (i==(3*n)/4 && j>n/4 && j<(3*n)/4 )||
                        (j==n/4 && i>n/4 && i<(3*n)/4)||(j==(3*n)/4 && i>n/4 && i<(3*n)/4)||
                        (i==j) && i>n/2 && j>n/2){
                System.out.print(s: "*");
                }
                else {
                System.out.print(s: " ");
                }
          }
            System.out.println( );
        }
//  output:\
```

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

```java
//pattern-2
        int n=5;
        for(int i=0;i<n;i++) {
            for(int j=0;j<n;j++) {
                if(i==(n-1)/2|| j==0 || j==n-1) {
                System.out.print(s: "*");
                }
                else {
                System.out.print(s: " ");
                }
          }
            System.out.println( );
        }
// output:
    *   *
    *   *
    *****
    *   *
    *   *
```

```java
 int n=10;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if( i==0 && j>(n-1)/2 || j-i>= (n-1)/2 || j==n-1 && i<(n-1)/2){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
    }
    System.out.println( );
}
//output:
//    ******
//     *****
//      ****
//       ***
//        **
//         *
```

```java
int n=10;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if((i==0 && j<(n-1)/2 || j==0 && i<(n-1)/2|| i+j==(n-1)/2 )){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
  }
    System.out.println( );
}
//output:
**********
*********
********
*******
******
*****
****
***
**
```

```java
int n=7;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if(j==0 || i+j==(n-1)/2 ||  i-j==(n-1)/2){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
  }
    System.out.println( );
}
//output
*   *
* *
**
*
**
* *
*   *
```

```java
int n=7;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if(i==0||j==0||i==(n-1)/2 || j==n-1) {
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
  }
    System.out.println( );
}
//output:
*******
*     *
*     *
*******
*     *
*     *
*     *
```

```
        int n=7;
        for(int i=0;i<n;i++) {
            for(int j=0;j<n;j++) {
                if((i==0 && j<n-1)||(j==0)||(i==n-1 && j<n-1)||(j==n-1&&
                i>0 && i<n-1)){
                System.out.print(s: "*");
                }
                else {
                System.out.print(s: " ");
                }
          }
            System.out.println( );
        }
//output:
    ******
    *     *
    *     *
    *     *
    *     *
    *     *
    ******
```

```java
        int n=10;
        for(int i=0;i<n;i++) {
            for(int j=0;j<n;j++) {
                if(i==0|| j==0 && i<(n-1)/2||i+j<=(n-1 )/2 || j-i>= (n-1)/2 || j==n-1 && i<
                (n-1)/2){
                System.out.print(s: "*");
                }
                else {
                System.out.print(s: " ");
                }
          }
            System.out.println( );
        }
//output:
    // **********
    // **** *****
    // ***    ****
    // **      ***
    // *        **
    //           *
```

```java
    int n=10;
    for(int i=0;i<n;i++) {
        for(int j=0;j<n;j++) {
            if((i==0 && j<(n-1)/2 || j==0 && i<(n-1)/2|| i+j==(n-1)/2 )){
            System.out.print(s: "*");
            }
            else {
            System.out.print(s: " ");
            }
      }
        System.out.println( );
    }
//output:
    // *****
    // *   *
    // * *
    // **
    // *
```

pattern-1

```
   int n=4;
    for(int i=0;i<4;i++) {
        for(int j=0;j<4;j++) {
            if(i==0 || i==n-1 || j==0 || j==n-1) {
            System.out.print("*");
            }
            else {
            System.out.print(" ");
            }
      }
        System.out.println( );
   }
```

output:

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

```java
int n=11;
  for(int i=0;i<n;i++) {
      for(int j=0;j<n;j++) {
          if(i+j>=(n-1)/2 && j<=(n-1)/2 && i<=(n-1)/2||
             i-j<=(n-1)/2 && i>=(n-1)/2 && j<=(n-1)/2 ||
             j-i<=(n-1)/2 && i<=(n-1)/2 && j >=(n-1)/2||
             i+j<=n-1+(n-1)/2 && i>=(n-1)/2 && j>=(n-1)/2) {
          System.out.print(s: "*");
          }
          else {
          System.out.print(s: " ");
          }
    }
      System.out.println( );
  }
```

output:

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

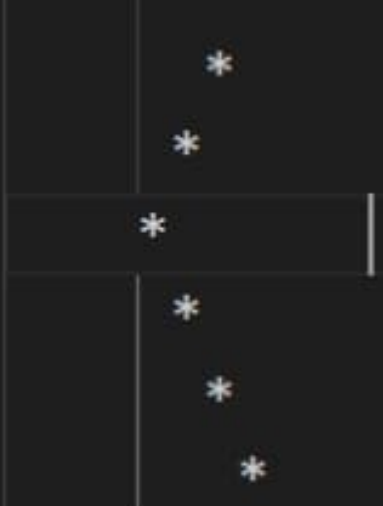
```java
int n=7;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if(i==j || j==0 || j==n-1){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
 }
    System.out.println( );
}
//output
```

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

```java
int n=7;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if((i==0)||(i==n-1)||j==(n-1)/2){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
  }
    System.out.println( );
}
//output:
*******
    *
    *
    *
    *
    *
*******
```

```java
//P-2 space
        int n=10;
         for(int i=0;i<n;i++) {
            for(int j=0;j<n;j++) {
                if(j==0 && i>(n-1)/2 || i==n-1 && j<(n-1)/2 ||i-j>=(n-1)/2 ){
                System.out.print(s: "*");
                }
                else {
                System.out.print(s: " ");
                }
            }
                System.out.println( );
        }
//output:
//   *
//   **
//   ***
//   ****
//   *****
//   ******
```

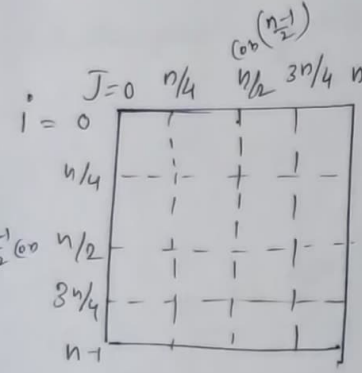
```java
int n=7;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if(i+j==(n-1)/2 ||  i-j==(n-1)/2){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
 }
    System.out.println( );
}
//
//output:
```



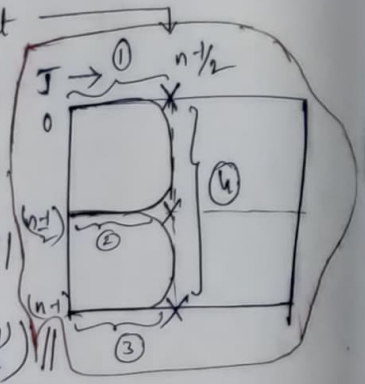
```java
int n=10;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if((i==0 && j>=0 && j<=(n-1)/2) || (j==0 && i>=0 && i<=(n-1)|| (j==(n-1)/2 && i>0 && i< (n-1)/2))||
            (i==(n-1)/2 && j>=0 && j<=(n-1)/2)){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
  }
    System.out.println( );
}
//
//output:
*****
*   *
*   *
*   *
*****
*
*
*
*
*
```

```java
int n=7;
for(int i=0;i<n;i++) {
    for(int j=0;j<n;j++) {
        if((i==0)||(i==n-1)||j==(n-1)/2){
        System.out.print(s: "*");
        }
        else {
        System.out.print(s: " ");
        }
  }
    System.out.println( );
}
//output:
*******
    *
    *
    *
    *
    *
*******
```

(10) Pattern Programming - Part-02 14/11/21



(1) Write a program to print



⇒ Condition to print start

(1) if((i==0 && j< (n-1)/2) ||

(2) ⇒ (i==(n-1)/2 && j<(n-1)/2) ||

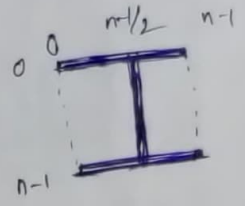
(3) ⇒ (i== n-1 && j<(n-1)/2)

(4) ⇒ (j==(n-1)/2 && i!=0 && i!=(n-1)/2 && i!=(n-1))

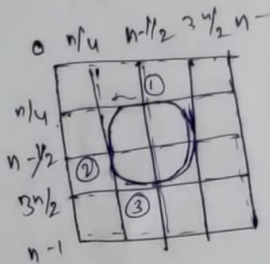
(2)

(2) WAP to Print I ?

if(i==0 && i==n-1 && j=(n-1)/2)



(3) WAP to Print □ ?



if(i==n/4 (1) && j>n/4 && j<(3n)/2) ||

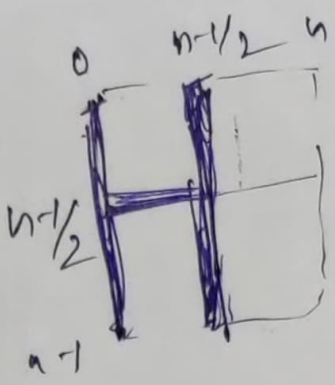
(j==n/4 (2) && i>n/4 && i<(3n)/2) ||

(i==(3n/2) (3) && j>n/4 && j<((3*n)/2)) ||

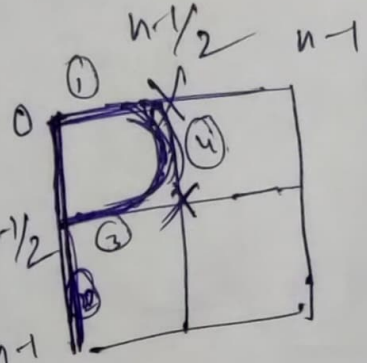
(j==((3*n)/2) && i>n/4 && i<((3*n)/2))

(5) WAP to Print H

if(j==0 || j==(3*n)/4 || i==(n-1)/2 && j<=(3*n)/4)



(6) WAP to Print P

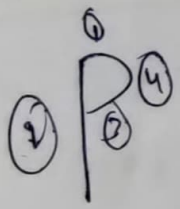


if((i==0 && j>=0 && j<(n-1)/2) ① ||

(j==0 && i>=0 && i<=n-1) ② ||

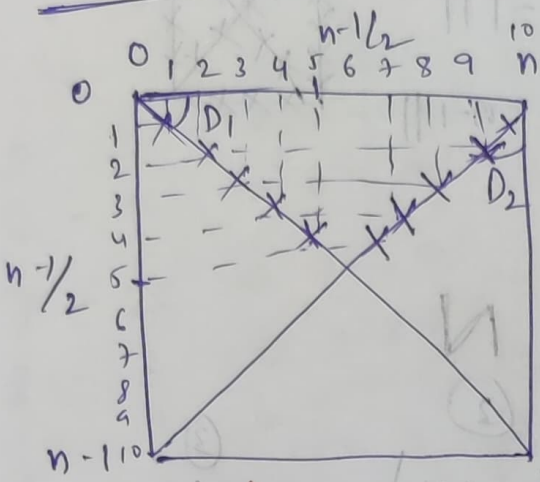
(i==(n-1)/2 && j>0 && j<(n-1)/2) ③ ||

(j==(n-1)/2 && i>0 && j<(n-1)/2) ④)



⑥ WAP to Print KXYZNMQWV

↳ Complex approach. Concept ① for Printing Diagonals.



diagonal D1
diagonal D2

For Diagonal D1

i	j	
0	0	— *
1	1	
2	2	
3	3	
4	4	
⋮	⋮	

$D_1 = i == j \Rightarrow *$

$D_1 \Rightarrow i == j$

For Diagonal D2

i	j	
0	10	⇒ 0+10 ⇒ 10
1	9	⇒ 1+9 ⇒ 11
2	8	⇒ 2+8 ⇒ 10
3	7	⇒ 3+7 ⇒ 10
4	6	⇒ 4+6 ⇒ 10
⋮	⋮	⋮
i	j	⇒ $i+j = n-1$

$D_2 \Rightarrow i+j = n-1$

Code :-

```
int n=10
for(int i=0; i<n; i++){
    for(int j=0; j<n; j++){
        if(i==j || i+j){
            S.o.P("*");
        }
        else {
            S.o.P(" ");
        }
    }
}
```

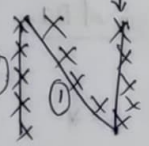
output :-

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

Eg:- ② WAP to Print

```
if( i==j || i+j==n-1 ||
    i==0 || j==0 || i==n-1 ||
    j==n-1)
```

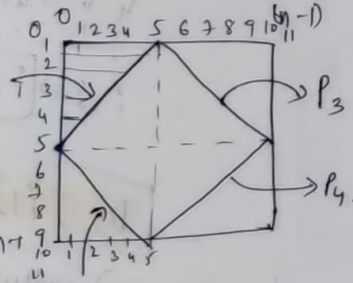
Eg ③ W.A.P to print N




```
if( i==j || j==0 || j==n-1)
```

P_1

Concept ①:- $n=12$



① for P_1

i	j	
5	0	
4	1	$\Rightarrow 4+1 \Rightarrow 5$
3	2	$\Rightarrow 3+2 \Rightarrow 5$
2	3	$\Rightarrow 2+3 \Rightarrow 5$
1	4	$\Rightarrow 1+4 \Rightarrow 5$
0	5	$\Rightarrow 0+5 = 5$
:	:	$\Rightarrow$ **$i+j==5$**

$P_1 \Rightarrow i+j = \frac{n-1}{2}$

② for P_2 $\quad n=11 \Rightarrow \frac{n-1}{2} = \frac{11-1}{2} = 5$

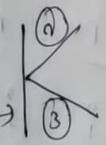
i	j	
5	0	$\Rightarrow 5-0 \Rightarrow 5$
6	-1	$\Rightarrow 6-1 \Rightarrow 5$
7	-2	$\Rightarrow 7-2 \Rightarrow 5$
8	-3	$\Rightarrow 8-3 \Rightarrow 5$
:	:	=
:	j	$\Rightarrow$ **$i-j = \left(\frac{n-1}{2}\right)$**

$P_2 \Rightarrow i-j = \left(\frac{n-1}{2}\right)$

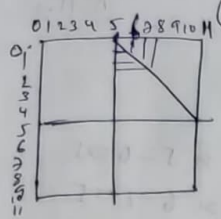
④ Eg ④ WAP to Print K

```
if( j==0 && i+j==(n-1)/2 &&
    i-j==(n-1)/2 )
```

```
if( j==0 && i+j==(n-1)/2 && i-j==(n-1)/2 )
    ①          ②           ③
```



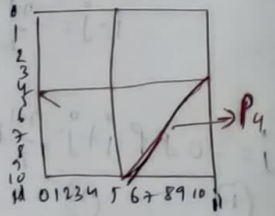
③ For P3



i	j	
0	5	⇒ 5 − 0 ⇒ 5
1	6	⇒ 6 − 1 ⇒ 5
2	7	⇒ 7 − 2 ⇒ 5
3	8	⇒ 8 − 3 ⇒ 5
4	9	⇒ 9 − 4 ⇒ 5
5	10	⇒ 10 − 5 ⇒ 5
:	:	:
i	j	⇒ $j - i = \frac{n-1}{2}$

$P_3 \Rightarrow j - i = \frac{n-1}{2}$

④ for P4 : n=12



i	j	
5	11	⇒ 5+11 ⇒ 16
6	10	⇒ 6+10 ⇒ 16
7	9	⇒ 7+9 ⇒ 16
8	8	⇒ 8+8 ⇒ 16
9	7	⇒ 9+7 ⇒ 16
10	6	⇒ 10+6 ⇒ 16
:	:	:
i	j	⇒ $i + j = n-1 + \left(\frac{n-1}{2}\right)$

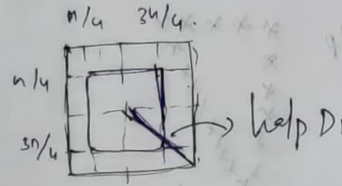
$P_4 = n-1 + \frac{(n-1)}{2}$

Eg ⑤ WAP to Print Z

```
if( i==0 || i==n-1 || i+j==(n-1) )
```

① ② ③

Eg ⑥ WAP to Print




```
if( (i==n/4 && j>n/4 && j<3n/4) ||
    (i==3n/4 && j>n/4 && j<3n/4) ||
    (j==n/4 && i>n/4 && i<3n/4) ||
    (j==3n/4 && i>n/4 && i<3n/4) ||
    (i==j && i>n/2 && j>n/2) .
```

formula

① $D_1 \Rightarrow i == j$

② $D_2 \Rightarrow i + j = n-1$

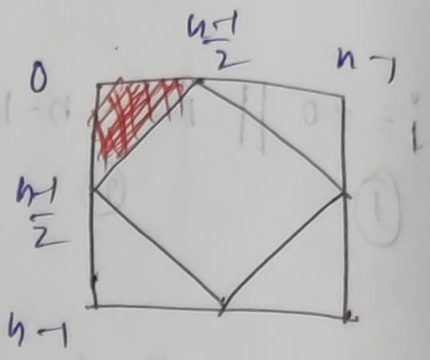
① $P_1 \Rightarrow i + j = \frac{n-1}{2}$

② $P_2 \Rightarrow i - j = \left(\frac{n-1}{2}\right)$

③ $P_3 \Rightarrow j - i = \left(\frac{n-1}{2}\right)$

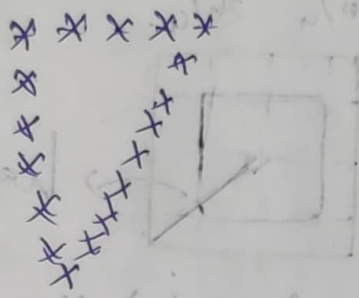
④ $P_4 = n-1 + \left(\frac{n-1}{2}\right)$

Space filling



(1) if (i==0 && j<=(n-1)/2 ||
j==0 && i<=(n-1)/2 ||
i+j == ((n-1)/2))

↳ o/p



(2) if (i==0 && j<=(n-1)/2 || j==0 && i<=(n-1)/2 ||
i+j<=((n-1)/2))

↳ o/p