

Pattern

i = Row, j = column

①

```

* 
* *
* * *
* * * *
* * * * *

```

① step

	1	2	3	4	5
1	*				
2	*	*			
3	*	*	*		
4	*	*	*	*	
5	*	*	*	*	*

② step 2 →

~~for i~~

i	j
1	1
2	1, 2
3	1, 2, 3
4	1, 2, 3, 4
5	1, 2, 3, 4, 5

step 3.

for

i	j
1	j <= 1
2	j <= 2
3	j <= 3
4	j <= 4
5	j <= 5

step 4.    j <= i

code ↳

```

main() {
    int i, j;
    for(i=1; i<=5; i++) {
        for(j=1; j<=5; j++) {
            if(j<=i)
                printf("%*s");
            else
                printf("  ");
        }
        printf("\n");
    }
}

```

3

3

Step 1.

i	1	2	3	4	5	j	1	2	3	4	5
1	*	*	*	*	*	1	*	*	*	*	*
2	*	*	*	*	*	2	*	*	*	*	*
3	*	*	*	*	*	3	*	*	*	*	*
4	*	*	*	*	*	4	*	*	*	*	*
5	*	*	*	*	*	5	*	*	*	*	*

Step 3.

i	j
1	<del>j &gt;= 5</del>
2	<del>j &gt;= 4</del>
3	<del>j &gt;= 3</del>
4	<del>j &gt;= 2</del>
5	<del>j &gt;= 1</del>

Step 4.

~~j >= 5~~  
~~j >= 6 - i~~

Question 3

*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*

Step 1.

i	1	2	3	4	5
1	*	*	*	*	*
2	*	*	*	*	*
3	*	*	*	*	*
4	*	*	*	*	*
5					*

Step 2.

i	j
1	1, 2, 3, 4, 5
2	2, 3, 4, 5
3	3, 4, 5
4	4, 5
5	5

Step 3.

i	j
1	<del>j &gt;= 1</del>
2	<del>j &gt;= 2</del>
3	<del>j &gt;= 3</del>
4	<del>j &gt;= 4</del>
5	<del>j &gt;= 5</del>

Step 4.

~~j >= 1~~

Question 4

Question 4.

\* \* \* \* \*

\* \* \* \*

\* \* \* \*

\* \* \* \*

\*

Step 1.

	1	2	3	4	5
1	*	*	*	*	*
2	*	*	*	*	
3	*	*	*		
4	*	*			
5	*				

Step 2.

- i j
- 1 1, 2, 3, 4, 5
- 2 1, 2, 3, 4
- 3 1, 2, 3
- 4 1, 2
- 5 1

Step 3

- i j
- 1  $j <= 5$
- 2  $j <= 4$
- 3  $j <= 3$
- 4  $j <= 2$
- 5  $j <= 1$

Step 4

$$j <= 6 - i$$

Question 5

\*

\*

\*

\*

\*

\*

\*

\*

\*

Step 1.

	1	2	3	4	5	6	7	8	9
1					*				
2					*	*	*		
3					*	*	*	*	*
4					*	*	*	*	*
5	*	*	*	*	*	*	*	*	*

Step 2:

- 1
- 2 4, 5, 6
- 3 3, 4, 5, 6, 7
- 4 2, 3, 4, 5, 6, 7, 8
- 5 1, 2, 3, 4, 5, 6, 7, 8, 9

Step 3

- i j
- 1  $j \geq 5 \text{ and } j \leq 5$
- 2  $j \geq 4 \text{ and } j \leq 6$
- 3  $j \geq 3 \text{ and } j \leq 7$
- 4  $j \geq 2 \text{ and } j \leq 8$
- 5  $j \geq 1 \text{ and } j \leq 9$

Step 4

$$j \geq 6-i \quad \text{and} \quad j \leq 4+i$$

Question 6

```

    *
   * *
  * * *
 * * * *
* * * * *

```

Step 1

	1	2	3	4	5	6	7	8	9
1	*				*				
2		*		*					
3	*		*		*				
4	*	*	*	*		*			
5	*	*	*	*	*	*			

Step 2

```

      5
     4   6
    3   5   7
   2   4   6   8
  1   3   5   7   9

```

Step 3

$$j \geq 5+k \quad \text{and} \quad j \leq 5+k$$

$$j \geq 4+k \quad \text{and} \quad j \leq 6+k$$

$$j \geq 3+k \quad \text{and} \quad j \leq 7+k$$

$$j \geq 2+k \quad \text{and} \quad j \leq 9+k$$

$$j \geq 1+k \quad \text{and} \quad j \leq 9+k$$

Step 4

$$j \geq 6-i+k \quad \text{and} \quad j \leq 4+i+k$$

code

main()

{

```

int i, n, k;
for (int i = 1; i <= 5; i++) {
    k = 1;
    for (int j = 1; j <= 9; j++) {
        if (j >= 6 - i + k && j <= 4 + i + k)
            cout << "*";
        else
            cout << " ";
    }
    cout << endl;
}

```

else

cout << " ";

cout << endl;

}

### Question 7

*	*	*	***	*	*	*
*	*	*	*	*	*	*
*	*	*		*	*	*
*	*			*	*	
*	*			*	*	
*				*	*	

### Step 1

~~Ques 7~~

	1	2	3	4	5	6	7	8	9
1	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*
3	*	*	*		*	*	*		
4	*	*			*	*			
5	*	*			*				

### Step 2

i	j	
1	1, 2, 3, 4, 5, 6, 7, 8, 9	
2	1, 2, 3, 4	6, 7, 8, 9
3	1, 2, 3	7, 8, 9
4	1, 2	8, 9
5	1,	9

### Step 2

- 1  $j <= 5 \text{ } || j >= 8$
- 2  $j <= 4 \text{ } || j >= 6$
- 3  $j <= 3 \text{ } || j >= 7$
- 4  $j <= 2 \text{ } || j >= 8$
- 5  $j <= 1 \text{ } || j >= 9$

### Step 4

$$j <= 6 - i \text{ } || \text{ } j >= 4 + i$$

### Question 8

	1						
		1	2	1			
		1	2	3	2	1	
		1	2	3	4	2	1

### Step 1

	1	2	3	4	5	6	7
1					1		
2				1	2	1	
3			1	2	3	2	1
4	1	2	3	4	3	2	1

### Step 2

i	j
1	4
2	3, 4, 5
3	2, 3, 4, 5, 6
4	1, 2, 3, 4, 5, 6, 7

Step 3

j

- 1  $j >= 4 \text{ } \& \text{ } j <= 4$
- 2  $j >= 3 \text{ } \& \text{ } 4 \leq j <= 5$
- 3  $j >= 2 \text{ } \& \text{ } j <= 6$
- 4  $j >= 1 \text{ } \& \text{ } j <= 7$

Step 5

$j >= 5 - i \text{ } \& \text{ } j <= 3 + i$
--

code

```

main() {
    int i, j, k;
    for(i=1; i<=4; i++) {
        k=1;
        for(j=1; j<=7; j++) {
            if(j>=5-i+4 & j<=3+i) {
                printf("%d", k);
            }
            else if(j<4)
                k++;
            else
                printf(" ");
        }
        printf("\n");
    }
}

```

9. Question

- |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| A | B | C | D | C | B | A |
| A | B | C |   | C | B | A |
| A | D |   |   | B | A |   |
|   | A |   |   |   |   | A |

Step 2

	1	2	3	4	5	6	7
1	A	B	C	D	C	B	A
2	A	B	C		C	B	A
3	A	B			B	A	
4	A						A

Step 2

- |   |                     |
|---|---------------------|
| 1 | 1, 2, 3, 4, 5, 6, 7 |
| 2 | 1, 2, 3, 5, 6, 7    |
| 3 | 1, 2, 6, 7          |
| 4 | 1, 7                |

Step 3

- |   |                                      |
|---|--------------------------------------|
| 1 | $j <= 4 \text{ } \& \text{ } j >= 4$ |
| 2 | $j <= 3 \text{ } \& \text{ } j >= 5$ |
| 3 | $j <= 2 \text{ } \& \text{ } j >= 6$ |
| 4 | $j <= 1 \text{ } \& \text{ } j >= 7$ |

Step 4

$j <= s - i \text{ || } j >= 3 + i$

code

main() {

int i, j;

char k;

for(i=1; i<=4; i++) {

    k = 'A' ;

    for(j=1; j<=7; j++) {

        if(j<=s-i || j>=3+i) {

            printf("%c", k);

            j<4 ? k++ : k-- ;

}

    else {

        printf(" ");

    ff(j==4)

        k-- ;

}

}

    printf("\n");

}

)

10. Questions

*							
*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*

Step 1

	1	2	3	4	5	6	7
1				*			
2				*	*	*	
3				*	*	*	*
4	*	*	*	*	*	*	*
5			*	*	*	*	*
6			*	*	*		
7				*			

Step 2

i	K	j	
1			
2			4
3			5
4		2, 3, 4, 5, 6, 7	
5		2, 3, 4, 5, 6	
6		3, 4, 5	
7		4	

Step 3

R	i	j
1 1	$j \geq 4 \text{ } \& \text{ } j \leq 4$	
2 2	$j \geq 3 \text{ } \& \text{ } j \leq 5$	
3 3	$j \geq 2 \text{ } \& \text{ } j \leq 6$	
4 4	$j \geq 1 \text{ } \& \text{ } j \leq 7$	
3 5	$j \geq 2 \text{ } \& \text{ } j \leq 6$	
2 6	$j \geq 3 \text{ } \& \text{ } j \leq 5$	
1 7	$j \geq 4 \text{ } \& \text{ } j \leq 4$	

Step 4

$$\boxed{j \geq 5-k \text{ } \& \text{ } j \leq 3+k}$$

code

```

main() {
    int i, j, k=0;
    for(i=1; i<=7; i++) {
        if(i<=4) k++; else k--;
    }
    for(j=1; j<=7; j++) {
        if(j >= 5-k & j <= 3+k)
            printf("*");
        else
            printf(" ");
    }
    printf("\n");
}

```

userdefine code

```

main() {
    int i, j, k=0, rows, n;
    printf("enter number of
rows");
    scanf("%d", &rows);
    n = (rows+1)/2;
    for(i=1; i<=rows; i++) {
        if(rows-i-2 == 0) {
            if(i <= n) k++;
            if(i > n) k--;
        }
        else
            i <= n-2 ? k++ : k--;
        for(j=1; j<=rows; j++) {
            if(j >= n+k-1 & j <= n+k)
                printf("*");
            else
                printf(" ");
        }
        printf("\n");
    }
}

```

use

## 11. question

```

+
* *
+ * *
* * * *
* * * *
* * *
+

```

### Step 1.

	1	2	3	4	
1	*				
2	*	*			
3	*	*	*		
4	*	*	*	*	
5	*	*	*		
6	*	*			
7	*				

### Step 2

i	j
1	1
2	1, 2
3	1, 2, 3
4	1, 2, 3, 4
5	1, 2, 3
6	1, 2
7	1

### Step 3

i	k	j
1	1	j <= 1
2	2	j <= 2
3	3	j <= 3
4	4	j <= 4
5	3	j <= 3
6	2	j <= 2
7	1	j <= 1

### Step 4

[j <= k]

### code

```
main() {
```

```
int i, j, k = 0;
```

```
for(i=1; i<=7; i++) {
    i<=4 ? k++ : k--;
    for(j=1; j<=4; j++) {
        if(j <= k)
            cout << "*";
        else
            cout << " ";
    }
    cout << endl;
}
```

```

    cout << endl;
}
}
```

```
else
```

```
cout << endl;
```

```
}
```

```
}
```

use define code

```

main() {
    int i, j, k = 0, rows;
    printf("enter number of
    rows");
    scanf("%d", &rows);
    for(i=1; i<=rows; i++) {
        if(rows%2 == 0) {
            if(i < rows/2)
                k++;
            if(i > rows/2 + 1)
                k--;
        } else
            i = (rows+1)/2;
        for(j=1; j<=i; j++) {
            if(j <= k)
                printf("*");
            else
                printf(" ");
        }
        printf("\n");
    }
}

```

Question 12

```

* * * * *
* * * * *
* * *
*

```

Step 1

	1	2	3	4	5	6	7
1	*	*	*	*	*	*	*
2		*	*	*	*	*	*
3			*	*	*		
4				*			

Step 2

i	j
1	1, 2, 3, 4, 5, 6, 7
2	2, 3, 4, 5, 6
3	3, 4, 5
4	4

Step 3

i	j
1	j >= 1 & j <= 7
2	j >= 2 & j <= 6
3	j >= 3 & j <= 5
4	j >= 4 & j <= 1

8019  
{ i = i + 1; j = 8 - i }

code

main() {

int i, j, k;

printf("Enter the Number of rows : ");

scanf("%d", &k);

for (i = 1; i <= k; i++) {

for (j = 1; j <= 2 \* k - 1; j++) {

if (j >= i + 1 & j <= 2 \* k - 1)

printf("\*");

else

printf(" "));

3 printf("\n");

}

3

question 13

1  
2 3 2  
3 4 5 4 3  
4 5 6 7 6 5 4

step 1

1	2	3	4	5	6	7
2		3	4	5	6	7
3		4	5	6	7	8
4	5	6	7	8	9	10

Step 2

i j

1 4

2 3, 4, 5

3 2, 3, 4, 5, 6

4 1, 2, 3, 4, 5, 6, 7

Step 3

i j

1 j >= 4 & j <= 4

2 j >= 3 & j <= 5

3 j >= 2 & j <= 6

4 j >= 1 & j <= 7

Step 4

j >= 5 - i & j <= 2 + i

code

main() {

int i, j, k;

for (i = 1; i <= 4; i++) {

Step 1

```

for(j=1; j<=7; j++)
{
    if(j>=5-i && j<=3+i)
        cout<<"*";
    else
        cout<<" ";
}

```

```
cout<<endl;
```

```
j<4? k++ : k--;
```

```
3
```

```
else
```

```
cout<<endl;
```

```
3
```

```
cout<<endl;
```

```
3
```

```
3
```

### Q14 Question

```
6 5 4 3 2 1 0
```

```
5 4 3 2 1 0
```

```
4 3 2 1 0
```

```
3 2 1 0
```

```
2 1 0
```

```
1 0
```

```
0
```

### Step 1

~~6 5 4 3 2 1 0~~

	1	2	3	4	5	6	7
1	6	5	4	3	2	1	0
2	5	4	3	2	1	0	
3	4	3	2	1	0		
4	3	2	1	0			
5	2	1	0				
6	1	0					
7	0						

### Step 2

3 (i+1) = j

1 (i+1) = 3, 4, 5, 6, 7

2 1, 2, 3, 4, 5, 6

3 1, 2, 3, 4, 5

4 1, 2, 3, 4

5 1, 2, 3

6 1, 2

7 1

### Step 3

i j

1 j <= 7

2 j <= 6

3 j <= 5

4 j <= 4

5 j <= 3

6 j <= 2

7 j <= 1

Step 1

$$\boxed{j <= 8-i}$$

Code

main() {

int i, j, k;

for(i=1; i<=7; i++) {

    k = 7 - i;

    for(j=1; j<=7; j++) {

        if(j <= 8-i) {

            printf("%d", k);

        k--;

} else

        printf(" ");

}

    printf("\n");

}

}

15. Question

	1	2						
1	2	3						
1	2	3	4					
1	2	3	4	5				
1	2	3	4	5	6			
1	2	3	4	5	6	7		
1	2	3	4	5	6	7	8	
1	2	3	4	5	6	7	8	9

Step 1.

1	2	3	4	5	1
					1
2					1 2
3					1 2 3
4					1 2 3 4
5					1 2 3 4 5
6					1 2 3 4
7					1 2
8					1
9					

Step 2

i	j	5
1		5
2		4
3		5
4		5
5	1	4
6	2	5
7	3	5
8	4	5
9	5	5

Step 3

i	k	j
1	1	5
2	2	4
3	3	3
4	4	2
5	5	1
6	4	2
7	3	3
8	2	4
9	1	5

Step 4

$$\boxed{j > k = b - k}$$

code

```

main() {
    int i, j, k = 0, n;
    for (i = 1; i <= 9; i++) {
        if (i < 6) k++;
        else k--;
        n = i;
        for (j = 1; j <= 5; j++) {
            if (j >= b - k)
                printf("%d", n);
            else n++;
        }
        else
            printf(" ");
        printf("\n");
    }
}

```

	1	2	3	4	5	6	7
1	*	*	*	*	*	*	
2	*	-	*	*	*	*	*
3	*	*	-	*	/		*
4	*	*	*	/	*	*	*
5	*	*	/	*	/	*	*
6	*	/	*	*	*	*	
7	1	*	*	*	*	*	

Step 2

1	2	3	4	5	6	7
2	1	3	4	5		7
3	1	2	4	6	7	
4	1	2	3	5	6	7
5	1	2	4	6	7	
6	1	3	4	5		7
7	2	3	4	5	6	

Step 3

i	j	Value
1	1	7
2	2	6
3	3	5
4	4	
5	3	5
6	2	1
7	1	1

Question 16

*	*	*	*	*	*	*
*	-	*	*	*	*	*
*	*	-	*	*	*	*
*	*	*	/	*	*	*
*	*	/	*	*	*	*
*	/	*	*	*	*	*
/	*	*	*	*	*	*

step 2

1  $\downarrow = 1$  ||  $\downarrow = 7$   
2  $\downarrow = 2$  ||  $\downarrow = 6$   
3  $\downarrow = 3$  ||  $\downarrow = 5$   
4  $\downarrow = 4$  ||  $\downarrow = 4$   
5  $\downarrow = 3$  ||  $\downarrow = 5$   
6  $\downarrow = 2$  ||  $\downarrow = 6$   
7  $\downarrow = 1$  ||  $\downarrow = 7$

~~Step 4~~

$$j = -i \quad \text{and} \quad j = 8 - i$$

1	1	1
2	2	6
3	3	5
4	-	4
5	5	3
6	6	2
7	7	1

code

main() {

int i, j;

```
for(i=1; i<=7; i++) {  
    for(j=1; j<=7; j++) {
```

96.  $i = i + 1 \quad i = 8 - i$  } ?

$$9.6 | i \div = 8 - j )$$

Penith " / " ;  
else

Penitentiary;

3 else

Permit ("\*");

3

Penitj ("ju"),

3

3

## Question 17

A dense grid of hand-drawn asterisks, arranged in approximately 12 rows and 12 columns. The asterisks are drawn with a dark blue ink pen on a white background. They are slightly irregular in size and placement, giving them a hand-drawn, organic feel. The grid covers most of the page, with some space at the top and bottom.

### Step 1

1	2	3	4	5	6	7	8	9
*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*
3	*	*	*		*	*	*	
4	*	*			*	*		
5	*					*		
6	*	*				*	*	
7	*	*	*			*	*	*
8	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*

### Step 3

- i                    j
- 1     $j <= 5 \text{ || } j >= 5$     1  
 2     $j <= 4 \text{ || } j >= 6$     2  
 3     $j <= 3 \text{ || } j >= 7$     3  
 4     $j <= 2 \text{ || } j >= 8$     4  
 5     $j <= 1 \text{ || } j >= 9$     5  
 6     $j <= 2 \text{ || } j >= 8$     4  
 7     $j <= 3 \text{ || } j >= 7$     3  
 8     $j <= 4 \text{ || } j >= 6$     2  
 9     $j <= 5 \text{ || } j >= 5$     1

### Step 4

$j <= 6 - k \text{ || } j >= 4 + k$

### code

main() {

int i, j, k = 0;

for (i = 1; i <= 9; i++) {

    i < 5 ? k++ : k--;

    for (j = 1; j <= 9; j++) {

        if ( $j <= 6 - k \text{ || } j >= 4 + k$ )

            cout << "\*";

        else

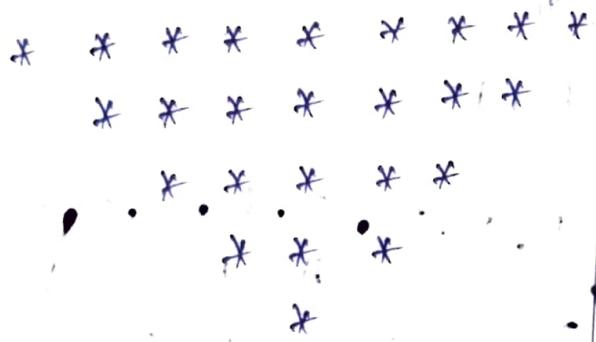
            cout << " ";

}

Point ("1W1");

3  
3

Question 18



Step 1

	1	2	3	4	5	6	7	8	9
1	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*
5	*								

Step 2

	i	j
1	1, 2, 3, 4, 5, 6, 7, 8, 9	
2	2, 3, 4, 5, 6, 7, 8	
3	3, 4, 5, 6, 7	
4	4, 5, 6	
5		5

Step 3

	i	j
1	$j >= 1 + i \leq 9$	
2	$j >= 2 + i \leq 8$	
3	$j >= 3 + i \leq 7$	
4	$j >= 4 + i \leq 6$	
5	$j >= 5 + i \leq 5$	

Step 4

	$j >= i + 10 - i$
--	-------------------

Question 19

A	A	B	A			
A	B	C	B	A		
A	B	C	D	C	B	A

Step 1

	1	2	3	4	5	6	7
1							
2				A			
3			A	B	C	B	A
4	A	D	C	D	C	B	A

Step 2

	i	j	
1			4
2			3, 4, 5
3			2, 3, 4, 5, 6
4			1, 2, 3, 4, 5, 6, 7

MAPS

- i            j  
 1     $j \geq 4 \text{ } \& \text{ } j \leq 4$   
 2     $j \geq 2 \text{ } \& \text{ } j \leq 5$   
 3     $j \geq 2 \text{ } \& \text{ } j \leq 6$   
 4     $j \geq 1 \text{ } \& \text{ } j \leq 7$

Step 4

$$j = 8 - i \text{ } \& \text{ } j \leq 3 + i$$

code

Main U C

```
int i, j;
char K;
for(i=1; i<=4; i++) {
  K = 'A';
  for(j=1; j<=7; j++) {
    if(j == 8 - i && j <= 3 + i) {
```

```
    K = 'A';
    for(j=1; j<=7; j++) {
```

```
      if(j == 8 - i && j <= 3 + i) {
```

```
        printf("%c", K);
```

```
      j < 4 ? K++ : K--;
```

```
}
```

```
else
```

```
  printf(" ");
```

```
}
```

```
printf("\n");
```

```
}
```

Question 20

A    1

A    B    1    2

A    B    C    1    2    3

A    B    C    D    1    2    3    4

Step 1

	1	2	3	4	5	6	7	8
1					A	1		
2			A	B	1	2		
3		A	B	C	1	2	3	
4	A	B	C	D	1	2	3	4

Step 2

i            j

1            4 5

2            3, 4, 5, 6

3            2, 3, 4, 5, 6, 7

4            1, 2, 3, 4, 5, 6, 7, 8

Step 3

i            j

1     $j \geq 4 \text{ } \& \text{ } j \leq 5$

2     $j \geq 3 \text{ } \& \text{ } j \leq 6$

3     $j \geq 2 \text{ } \& \text{ } j \leq 7$

4     $j \geq 1 \text{ } \& \text{ } j \leq 8$

Step 1

$$j >= 5 - i \quad \& \quad j <= 4 + i$$

code

main() {

int i, j, k;

for(i=1; i<=4; i++) {

    K = 'A' ;

    for(j=1; j<=8; j++) {

        if(j >= 5 - i & j <= 4 + i)

            { if(j == 5)

                K = '1' ;

                printf("%c", K);

                K++;

            3 else

                printf(" ");

    3

        printf("\n");

3

3

Question 21

*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*

Step 1

	1	2	3	4	5	6	7	8	9
1	*			*	*	*	*	*	*
2		*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*

Step 2

i

j

4, 5, 6, 7, 8

2, 3, 4, 5, 6, 7

3, 2, 3, 4, 5, 6

4, 1, 2, 3, 4, 5

Step 3

i

j

$j >= 4 + i \& j <= 8$

$j >= 3 + i \& j <= 7$

$j >= 2 + i \& j <= 6$

$j >= 1 + i \& j <= 5$

Step 4

$$j >= 5 - i \quad \& \quad j <= 9 - i$$

Question 22

	1		
1	2	A	
1	2	B	
1	2	C	

Step 1

	1	2	3	4	5	6	7	
1				1				
2			1	2	A			
3		1	2	3	A	B		
4	1	2	3	4	A	B	C	

Step 2

- | i | j                   |
|---|---------------------|
| 1 | 4                   |
| 2 | 2, 4, 5             |
| 3 | 2, 3, 4, 5, 6       |
| 4 | 1, 2, 3, 4, 5, 6, 7 |

Step 3

- | i | j                              |
|---|--------------------------------|
| 1 | $j >= 4 \text{ and } j \leq 4$ |
| 2 | $j >= 3 \text{ and } j \leq 5$ |
| 3 | $j >= 2 \text{ and } j \leq 6$ |
| 4 | $j >= 1 \text{ and } j \leq 7$ |

Step 4

$j >= 5 - i \text{ and } j \leq 3 + i$

Code

main() {

int i, j, K;

for (i = 1; i <= 4; i++) {

K = 99;

for (j = 1; j <= 7; j++) {

if ( $j >= 5 - i \text{ and } j \leq 3 + i$ ),

Print("Y.C", K);

K++;

if (j == 4)

K = 15;

else

Print(" ");

}

Print(" ");

3

3

Question 23

1

1 0

1 0 1

1 0 1 0

1 0 1 0 1

1 0 1 0 1 0

Step 1

	1	2	3	4	5	6
1	1					
2	1	0				
3	1	0	1	0	1	1
4	1	0	1	0	1	1
5	1	0	1	0	1	1
6	1	0	1	0	1	0

Step 2

- | i | j                |
|---|------------------|
| 1 | 1                |
| 2 | 1, 2             |
| 3 | 1, 2, 3          |
| 4 | 1, 2, 3, 4       |
| 5 | 1, 2, 3, 4, 5    |
| 6 | 1, 2, 3, 4, 5, 6 |

Step 3

- | i | j      |
|---|--------|
| 1 | j <= 1 |
| 2 | j <= 2 |
| 3 | j <= 3 |
| 4 | j <= 4 |
| 5 | j <= 5 |
| 6 | j <= 6 |

Step 4

$j < i$

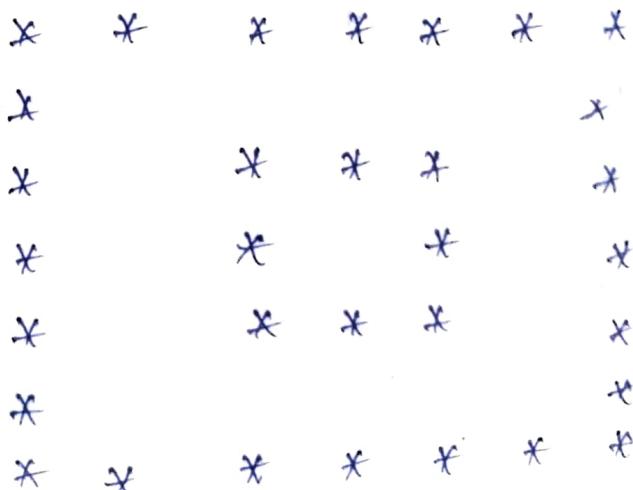
Code

```

main() {
    int i, j, k;
    char t[10][10];
    scanf("%d", &k);
    for(i = 1; i <= k; i++) {
        k = k - i;
        for(j = i; j <= k; j++)
            printf("%d", j);
        printf("\n");
    }
}

```

Question 24



Step 1

	1	2	3	4	5	6	7
1	*	*	*	*	*	*	*
2	*						*
3	*	*	*	*		*	
4	*	*	*	*		*	
5	*	*	*	*	*		
6	*					*	
7	*	*	*	*	*	*	

Step 2

	i	j	
1	1, 2, 3, 4, 5, 6, 7		
2	1,		7
3	1, 2, 3, 4, 5, 7		
4	1, 3, 5, 7		
5	1, 3, 4, 5, 7		
6	1,		7
7	1, 2, 3, 4, 5, 6, 7		

Code

main() {

int i, j;

for(i=1; i<=7; i++) {

for(j=1; j<=7; j++) {

if((i==1 || i==7 || j==1  
|| j==7) || (i>=3 &&  
i<=5 && j>=3 &&  
j<=5) + (i==3  
|| i==5 || j==3 || j==5))

printf(" \* ");

else

printf(" ");

}

printf("\n");

}

Step 2

### Question 25

	0			
	1	2	1	
5	2	3	4	3
	4	5	6	7
	6	7	8	9
	0			
	2			
	4			
	6			
	8			
	0			
	8			
	6			
	4			
	2			
	0			
	8			
	6			
	4			
	2			
	0			

### Step 2

1	i
1	1
2	1, 2
3	1, 2, 3
4	1, 2, 3, 4

### Step 3

i	j
1	j <= 1
2	j <= 2
3	j <= 3
4	j <= 4

### Step 4

j <= i

### code

```

main() {
    int i, j;
    char k;
    for(i=1; i<=4; i++) {
        k = 64 + i;
        for(j=1; j<=4; j++) {
            if(j==i)
                printf("%c", k);
            else
                printf(" ");
        }
        printf("\n");
    }
}

```

### Question 26

- A
- B A
- C B A
- D C B #

### Step 1

1	1	2	3	4
2	D	A		
3	C	B	A	
4	D	C	B	A

### Question 27

```

    1
  2 1 2
 3 2 1 2 3
 4 3 2 1 2 3 4

```

#### Step 1

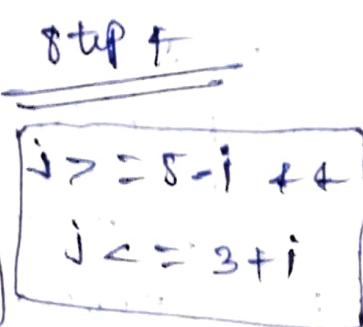
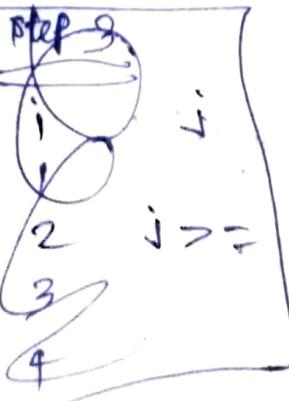
	1	2	3	4	5	6	7
1							
2		2	1	2			
3		3	2	1	2	3	
4	4	3	2	1	2	3	4

#### Step 2

i	j
1	4
2	3, 4, 5
3	2, 3, 4, 5, 6
4	1, 2, 3, 4, 5, 6, 7

#### Step 3

i	j
1	$j \geq 4 \text{ and } j \leq 4$
2	$j \geq 3 \text{ and } j \leq 5$
3	$j \geq 2 \text{ and } j \leq 6$
4	$j \geq 1 \text{ and } j \leq 7$



### Question 28

#### code

main()

{

int i, j, k;

for(i=1; i<=4; i++) {

    k = i;

    for(j=1; j<=7; j++) {

        if((j>=5-i) && (j<=3+i)) {

            printf("%d", k);

        j < 424 = -; k++;

}

else

    printf(" ");

}

    printf("\n");

}

}

### Question 28

1

3 \* 2

4 \* 5 \* 6

10 \* 9 \* 8 \* 7

11 \* 12 \* 13 \* 14 \* 15

#### Step 1

step 1

	1	2	3	4	5	6	7	8	9
1	*	*	*	*	*	*	*	*	*
2	3	*	2						
3	*	8	*	5	*	6			
4	*	10	*	9	*	8	*	7	
5	*	11	*	12	*	13	*	14	*
									15

step 2

	i	j
1	1	
2	1	2 3
3	1	2 3 4 5
4	1	2 3 4 5 6 7
5	1	2 3 4 5 6 7 8 9

step 3

	i	j
1		j >= 1
2		j >= 3
3		j >= 5
4		j >= 7
5		j >= 9

step 4

$$j = 2 \times i - 1$$

code

main() {

int i, j, flag, k = 0, p;

for (i = 1; i <= 5; i++) {

if (i \* 2 - 1 == 1)

k = k + 1;

else

k = -i;

k = k + 1;

}

flag = 1; /\*

p = k;

for (j = 1; j <= 9; j++) {

if (j <= 2 \* i - 1) {

if (flag == 1) {

printf("%d", p);

if (i \* 2) {

p++; k++;

}

else

p--;

}

printf("%d");

flag = 1 - flag;

}

else

printf(" ");

}

printf("\n");

}

i < j

	1	2	3	4	5	6	7	8	9
1	*								
2	3	*	2						
3	*		5	*	6				
4	10	*	9	*	8	*	7		
5	11	*	12	*	13	*	14	*	15

step 2

	i	j
1	1	
2	1	2 3
3	1	2 3 4 5
4	1	2 3 4 5 6 7
5	1	2 3 4 5 6 7 8 9

step 3

	i	j
1		j >= 1
2		j >= 3
3		j >= 5
4		j >= 7
5		j >= 9

step 4

$$\boxed{j = 2 \times i - 1}$$

code

main() {

int i, j, flag, k = 0, p;

for (i = 1; i <= 5; i++) {

if (i > 2) {

k = k + 1;

} else

k = -;

k = k + 1;

}

flag = 1;

p = k;

for (j = 1; j <= 9; j++) {

if (j <= 2 \* i - 1) {

if (flag == 1) {

printf("%d", p);

} else {

p++; k++;

} else

p = -;

} else

printf("%d");

flag = 1 - flag;

} else

printf(" ");

} }

}

## Question 29

		A		
	C	B		
	F	E	D	
	J	I	H	G
O	N	M	L	K

### Step 1

	1	2	3	4	5
1					A
2					C B
3			F	E	D
4		J	I	H	G
5	O	N	M	L	K

### Step 2

- i              j
- 1              5
- 2              4, 5
- 3              3, 4, 5
- 4              2, 3, 4, 5
- 5              1, 2, 3, 4, 5

### Step 3

- i              j
- 1               $j \geq 5$
- 2               $j \geq 4$
- 3               $j \geq 3$
- 4               $j \geq 2$
- 5               $j \geq 1$

### Step 4

$$j >= 6 - i$$

## QUESTION 30

### code

```
main() {
```

```
    int i, j;
```

```
    char k = 64;
```

```
    for(i = 1; i <= 5; i++) {
```

```
        k = k + 2 * (i - 1) + 1;
```

```
        for(j = 1; j <= 5; j++) {
```

```
            if(j >= 6 - i)
```

```
                printf("%c", k--);
```

```
            else
```

```
                printf(" ");
```

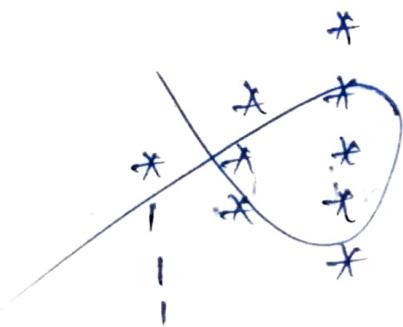
```
}
```

```
printf("\n");
```

```
}
```

```
}
```

## QUESTION 30



### Question 32

	1	2	3	4	5
1	*				*
2		*	*		
3			*		
4	*		*		
5	*			*	

#### Step 2

i	j	
1	1	5
2	2	4
3	3	
4	2	4
5	1	5

#### Step 3

- | i | j                |
|---|------------------|
| 1 | j == 1    j == 5 |
| 2 | j == 2    j == 4 |
| 3 | j == 3           |
| 4 | j == 2    j == 4 |
| 5 | j == 1    j == 5 |

#### Step 4

$j == i \text{ || } j == n+1-i$

```
for(i=1; i<=n; i++) {
    for(j=i; j<=n+i-1; j++) {
        if(j==i || j==n+1-i)
```

```
        printf("%d", *arr);
```

```
    else
```

```
        printf(" ");
```

3

```
printf("%d\n", *arr);
```

3

3

### Question 33

	1	2	3	4	5	6	7
1	A	B	C	D	E	F	G
2	A	B	C		E	F	G
3	A	B				F	G
4	A						G

#### Step 2

i	j	
1	1, 2, 3, 4, 5, 6, 7	
2	1, 2, 3	5, 6, 7
3	1, 2	6, 7
4	1	7

- | i | j                |
|---|------------------|
| 1 | j <= 4    j >= 4 |
| 2 | j <= 3    j >= 5 |
| 3 | j <= 2    j >= 6 |
| 4 | j <= 1    j >= 7 |

#### Step 3

- | i | j                |
|---|------------------|
| 1 | j <= 4    j >= 4 |
| 2 | j <= 3    j >= 5 |
| 3 | j <= 2    j >= 6 |
| 4 | j <= 1    j >= 7 |

### Code

```
main() {
```

```
    int i, j, n;
```

```
    printf("Enter a number of rows: ");

```

```
    scanf("%d", &n);
```

Step 4

$j \leq 5-i \text{    } j \geq 3+i$
-------------------------------------

code

main() {

int i, j;

char k;

for (i=1; i<=4; i++) {

k = 'A';

for (j=1; j<=7; j++) {

if ( $j \leq 5-i \text{ || } j \geq 3+i$ )

printf("%c", k);

else

printf(" ");

k++;

}

printf("\n");

}

}

question 34

1

6 2

1 0 7 3

1 3 1 1 8 4

1 5 1 4 1 2 9 5

Step 1

	1	2	3	4	5	6	7	8
1	1							
2	6	2						
3	1	0	7 3					
4	1	3	1 1	8 4				
5	1	5	1 4	1 2	9 5			

Step 2

i                    j

1                    1

2                    1 2

3                    1 2 3 4

4                    1 2 3 4 5 6

5                    1 2 3 4 5 6 7 8

Step 3

i                    j                    K

1                     $j \leq 1$             1 ] 5

2                     $j \leq 2$             6 ] 4

3                     $j \leq 3$             10 ] 3

4                     $j \leq 6$             13 ] 2

5                     $j \leq 8$             15 ]

Step 4

K = 1

$$K = K + \frac{1 + \text{now} - i}{5}$$

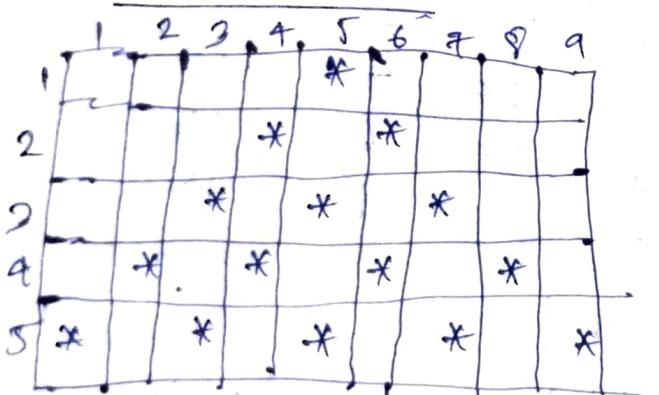
## code

```

main() {
    int i, j, row, p, k = 1;
    printf("Enter number of rows");
    scanf("%d", &row);
    for(i=1; i<=row; i++) {
        p = k;
        for(j=1; j<=i; j++) {
            printf("%d", p);
            p = (p - (row - i - j));
        }
        printf("\n");
        k = k + row - i;
    }
}

```

## Question 35



Step.2

i	j	
1		5
2		4 6
3	3	5 7
4	2 4	6 8
5	1 3 5 7	9

```

main() {
    int i, k, flag = 1, some;
    printf("Enter number of
    lines");
    scanf("%d", &row);
    for(i=1; k=0; i<=2*row-1) {
        if(i < row-k)
            printf("  ");
        else
            if(flag)
                printf("%d", i);
            else
                printf("%d", i);
        flag = 1 - flag;
        if(i == row+k) {
            k++;
            printf("\n");
            if(i == 2*row-1)
                break;
        }
    }
}

```

3  
3

### Question 36

	1	2	3	4	5
1	0				
2	0	1			
3	0	2	4		
4	0	3	6	9	
5	0	4	8	12	16

### Step 2

	i	j
1	1	
2	1	2
3	1	2 3
4	1	2 3 4
5	1	2 3 4 5

### Step 3

	i	j
1		$j \leq 1$
2		$j \leq 2$
3		$j \leq 3$
4		$j \leq 4$
5		$j \leq 5$

### Step 4

$j \leq 1$

### Code

```

main()
{
    int i,j,k;
    for(i=1;i<=5;i++)
    {
        k=0;
        for(j=1;j<=5;j++)
        {
            if(j<=i)
                printf("%d",k);
            k=k+1;
        }
        else
            printf("  ");
    }
    printf("\n");
}

```