

# CS & IT ENGINEERING

## Chapter 02

### Programming in C Control Flow Statements Lec- 06




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TOPICS TO BE  
COVERED



More on Loops-2

```
Prod = 1;
for (i = 1; i <= 5; i++)
{
    Prod = Prod * i;
}
printf("%d", Prod);
```

```
Prod = 1;
for (i = 1; i <= 6; i++)
{
    Prod = Prod * i;
}
printf("%d", Prod);
```

```
Prod = 1;
for (i = 1; i <= 7; i++)
{
    Prod = Prod * i;
}
printf("%d", Prod);
```

```
for (n = 5; n <= 7; n++)
{
```

```
    Prod = 1;
    for (i = 1; i <= n; i++)
    {
        Prod = Prod * i;
    }
    printf("%d", Prod);
}
```


$\Rightarrow n!$

1 → 10

```
for(n = 1; n <= 10; n++)  
{
```

n  
factorial code

```
}
```

Perfect No. 

10 to 20

```
{
```

Perfect No.  
Code

```
}
```

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \quad n \text{ terms}$$

I/P:  $x, n$  (no. of terms)

$$x^0 + \frac{x^1}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!}$$

$n = 4$   
 $x = 2$

float sum = 0.0

```

for(i = 0; i <= 3; i++)
{
    y = xi;
    z = fact(i);
    sum = sum + y/z;
}
    
```

Code for  $a^b$

Code for factorial

1.

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

## Pattern printing

Math

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

5 times

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

Same  
Code

```
    printf("12345\n");
}
```



		Col 5				
		1	2	3	4	5
Rows	1	1				
	2	1	2			
	3	1	2	3		
	4	1	2	3	4	
	5	1	2	3	4	5

Row	Col	last val of col.
1	1	1
2	1, 2	2
3	1, 2, 3	3
4	1, 2, 3, 4	4
5	1, 2, 3, 4, 5	5

```
for (Row = 1; Row <= 5; Row++)
```

```
{
```

```
for (col = 1; col <= Row; col++)
```

```
{
```

```
printf("/d", col);
```

```
}
```

```
}
```

wrong

		Cols				
		1	2	3	4	5
Rows	1	1				
	2	1	2			
	3	1	2	3		
	4	1	2	3	4	
	5	1	2	3	4	5

```

for (Row = 1; Row <= 5; Row++)
{
    for (col = 1; col <= Row; col++)
    {
        printf("%d", col);
    }
    printf("\n");
}

```



Row	
1	col = 1
2	col = 1, 2

1
1 2

```
for (Row = 1; Row <= 5; Row++)
```

```
{
```

```
for (col = 1; col <= Row; col++)
```

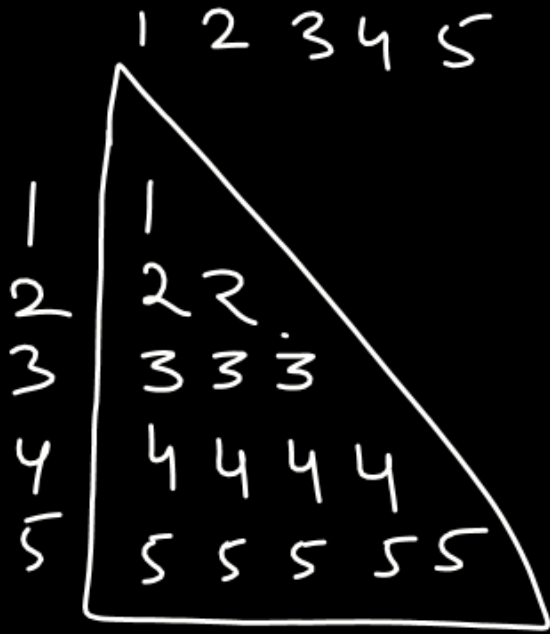
```
{
```

```
printf("%d\n", col)
```

```
}
```

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

```
}
```



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

```
    for(col=1; col<=Row; col++)  
    {  
        printf("%d", Row);  
    }  
    printf("\n");
```

```
}
```

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

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

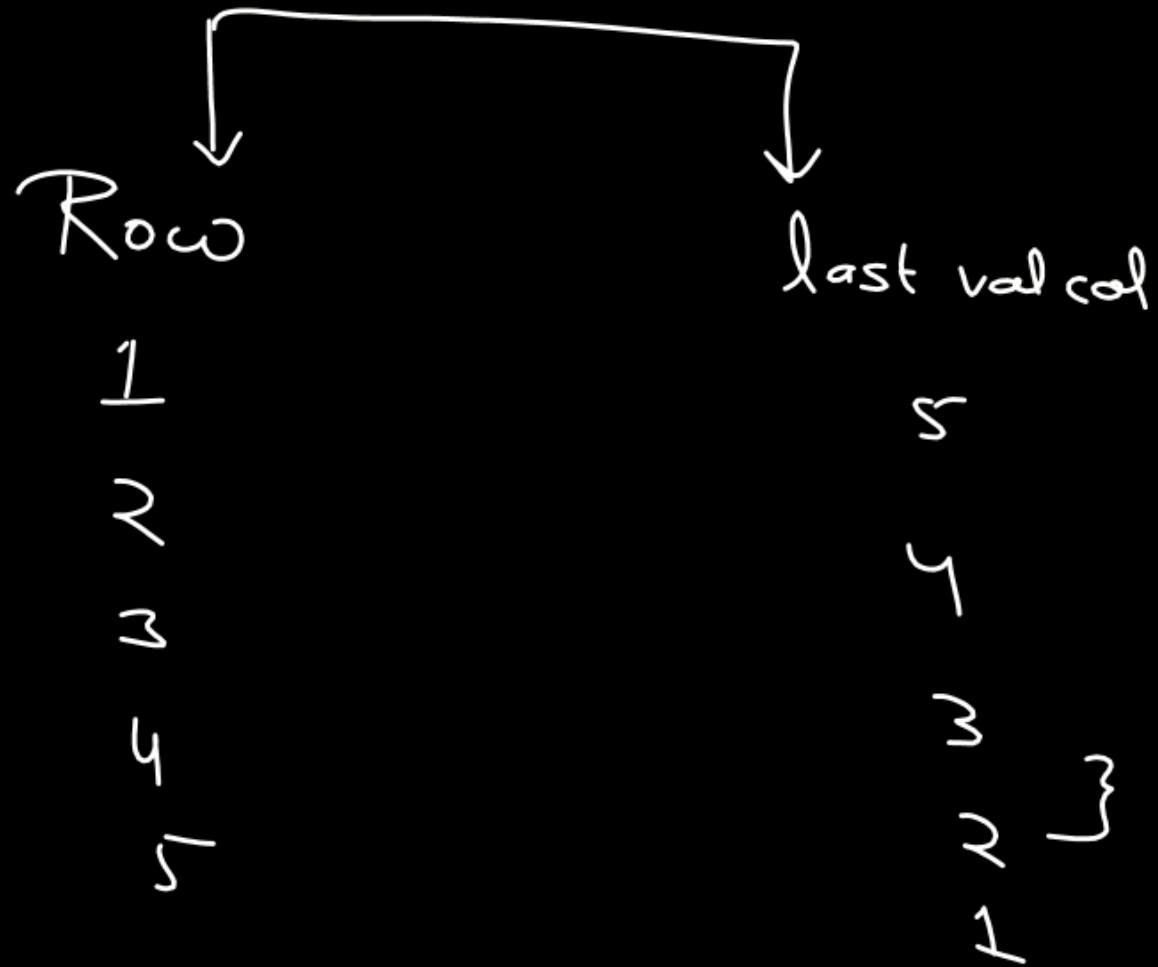
```
  for(col=1; col<=    ; col++)
```

Row	col	last val col
1	1,2,3,4,5	5
2	1,2,3,4	4
3	1,2,3	3
4	1,2	2
5	1	1

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

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

```
  for(col=1; col<=6Row; col++)
```



$$\Rightarrow \text{Row} + \text{last\_val\_col} = 6$$

$$\text{last\_val\_col} = 6 - \text{Row}$$



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

$n = 5$   
 $5 \rightarrow n$   
 $6 \rightarrow (n+1)$

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

```
    for(col=1; col<=Row; col++)
```

```
    {
```

```
        printf("%d", col);
```

```
    }
```

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

```
}
```

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

$$n = 3$$

Row	
1	1 to 3 $\Rightarrow$ 1 2 3
$\Leftarrow$ 2	1 to 2 $\Rightarrow$ 1 2
$\Leftarrow$ 3	1 to 4 - 3 $\Rightarrow$ 1

```
for(Row=1; Row<=n; Row++)
{
```

```
    for(col=1; col<=(n+1)-Row; col++)
```

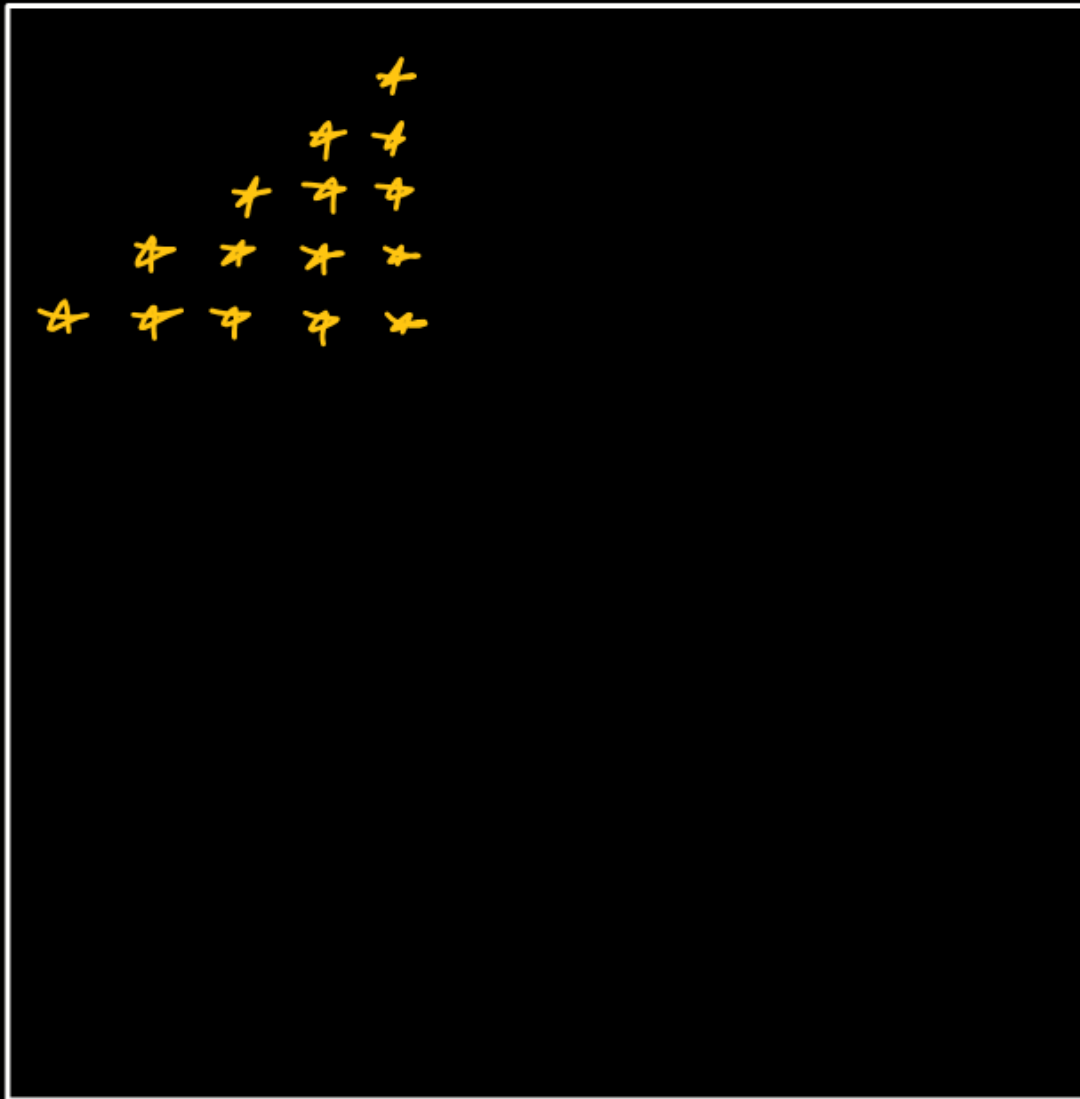
```
    {
```

```
        printf("%d", col);
```

```
    }
```

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

```
}
```



Every row (5 row)

→ some space

→ some \*

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

code for  
space

code for  
star

```
}
```

```

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

```

Math  
Analysis

```

for (Row=1; Row<=5; Row++)
{
    for(space=1; space<=5-Row; space++)
    {
        printf(" ");
    }
    for(star=1; star<=Row; star++)
        printf("*");
    printf("\n");
}

```

Row	space	Star
1	4	1
2	3	2
3	2	3
4	1	4
5	0	5

no. of  
space  
in each  
row = 5-row



```

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

```

S min

```

for(Row = 1; Row <= 5; Row++)
{
    for(space = 1; space <= 5 - Row; space++)
        printf(" ");

```

Row	space	# of Space = 5 - Row
1	4	
2	3	
3	2	
4	1	
5	0	

}

```

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

```

Row	Star	
1	1	$2 \cdot 1 - 1 = 1$
2	3	$2 \cdot 2 - 1 = 3$
3	5	$2 \cdot 3 - 1 = 5$
4	7	
5	9	

5 min

```

for (Row = 1; Row <= 5; Row++)
{
    for (space = 1; space <= 5 - Row; space++)
        printf(" ");
    for (star = 1; star <= 2 * Row - 1; star++)
        printf("*");
    printf("\n");
}

```

```

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

```

if  
for  
while } first  
semi colon

Row	Star
1	9 $2 * 5 - 1$
2	7 $2 * 4 - 1$
3	5 $2 * 3 - 1$
4	3 $2 * 2 - 1$
5	1 $2 * 1 - 1$

Row	Space
1	0
2	1
3	2
4	3
5	4

# of space = Row - 1

```

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

```

दिशेंत

Anshuman

Math

if  
for  
while } first  
semi colon

Row	Space
1	0
2	1
3	2
4	3
5	4

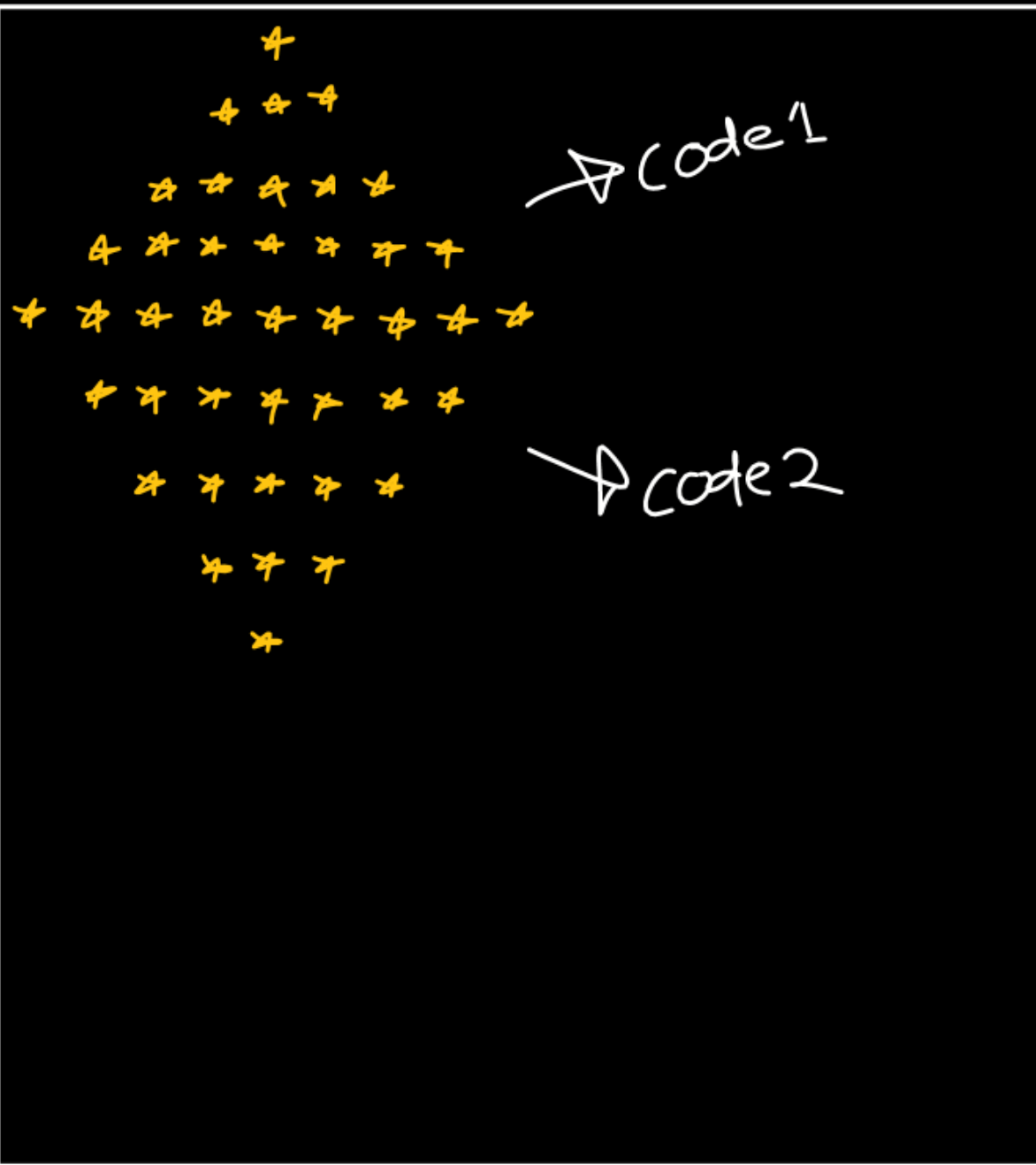
# of space = Row - 1

Row  
1  
2  
3  
4  
5

Star  
9  
7  
5  
3  
1

$2 * (6 - \text{Row}) - 1$   
 $2 * 5 - 1$   
 $2 * 4 - 1$   
 $2 * 3 - 1$   
 $2 * 2 - 1$   
 $2 * 1 - 1$





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

$9 \times 9$   $\rightarrow$  81 times  
 Every row  
 { Some Underscore  
 then  
 Some star  
 then  
 same No. of Underscore

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

Code 1

Code 2

Row	underscore
1	4
2	3
3	2
4	1
5	0

```

for (Row = 1; Row <= 5; Row++)
{
    for (under = 1; under <= 5 - Row; under++)
        printf("-");

    for (star = 1; star <= 2 * Row - 1; star++)
        printf("*");

    for (under = 1; under <= 5 - Row; under++)
        printf("-");

    printf("\n");
}

```

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

-  
Code1  
  
Code2



Q

```
for (i=1; i<=n; i=i*3)
```

```
{
```

```
  for (j=i; j<=n; j++)
```

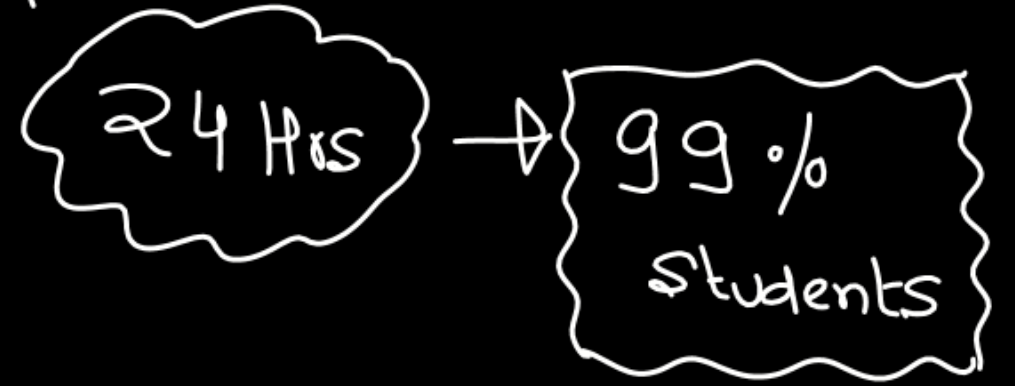
```
  {
```

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

```
  }
```

```
}
```

$n \geq 1$



dependent loop

{ # of times  
printf  
executed }

Next class

$$n=5$$

12345  
1234  
123  
12  
1

$$n=6$$

123456  
12345  
1234  
123  
12  
1

$$n=3$$

123  
12  
1

