Lecture 2

Saturday, 4 January 2020 1:31 PM

Number Systems <- Binary, Decimal, Octal.

$(32)_{10} \rightarrow (?)_2$.

2	32
2	16
2	8
2	4
2	2
2	1
	0

$0 \times 10^0 + 0 \times 10^1 + 0 \times 10^2 + 0 \times 10^3 + 0 \times 10^4 + 1 \times 10^5$

$\Rightarrow (100000)_2$.

$(1010\,1)_2 \rightarrow (?)_{10}$ ✓

$2^4\ 2^3\ 2^2\ 2^1\ 2^0$

$1\ 0\ 1\ 0\ 1 \Rightarrow 2^4 + 2^2 + 2^0 \times 1$

$= 16 + 4 + 1 = 21$.

10	10101
10	1010
10	101
10	10
10	1
	0

$1 \times 2^0 + 0 \times 2^1 + 1 \times 2^2 + 0 \times 2^3 + 1 \times 2^4$

$\Rightarrow (21)_{10}$.

Octal -> Base 8.

0	10	20
1	11	21
2	12	22
3	:	:
4	:	:
5	:	:
6		:
7	17	27.

$(38)_8 \rightarrow (?)_{10}$. x

$(37)_8 \rightarrow (?)_{10}$ ✓

10	37
10	3
	0

$7 \times 8^0 + 3 \times 8^1$

$= 24 + 7 \Rightarrow (31)_{10}$.

$(45)_{10} \rightarrow (?)_8$.

8	45
8	5
	0

5×10^0

$5 \times 10^1 = 5 \times 10 + 5 \times 1$

$= (55)_8$.

Pattern.

① * * * * *
* * * * *
* * * * *
* * * * *
* * * * *

N=5

Console.


```
psvm(String[] args){
    int N=5;
    int nst = n;
    int row = 1;
    while(row <=n){
        int cst = 1;
        while(cst <=nst){
            Sysop("*");
            cst++;
        }
        row++;
        nst= n;
        System.out.println();
    }
}
```

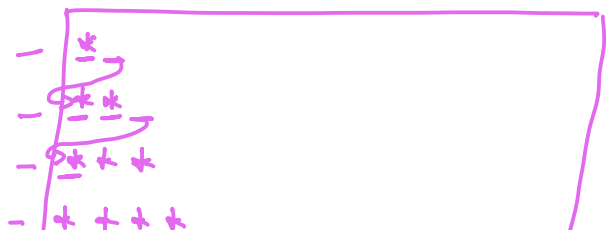
1<=5 ✓, 2<=5

1<=5, 2<=5, 3<=5, 4<=5, 5<=5

6<=5 x

n=5.

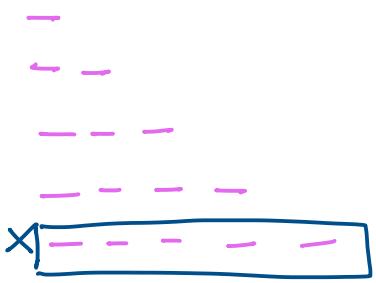
*
* *
* * *
* * * *
* * * * *

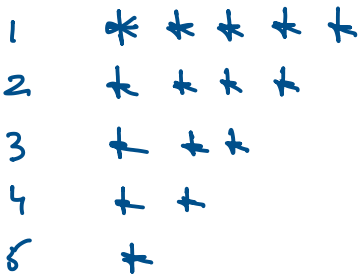


```
psvm(String[] args){
    int n=5;
//3  int nst=1;  nst=n
    int row=1;
    while(row<=n){
        int cst=1;
        while(cst<=nst){
            Sysop("*");
            cst++;
        }
        Sysop();
        nst++;
        row++;
    }
```

2<=1
1<=2
2<=2
3<=2

nst--;





① 1
2 + 2
3 + 3 + 3
4 + 4 + 4 + 4
5 + 5 + 5 + 5 + 5 .

N=5

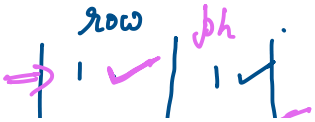
② 1
2 3
4 5 6
7 8 9 10

↪ N=4

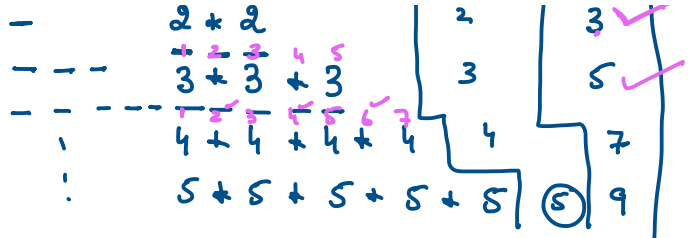
③

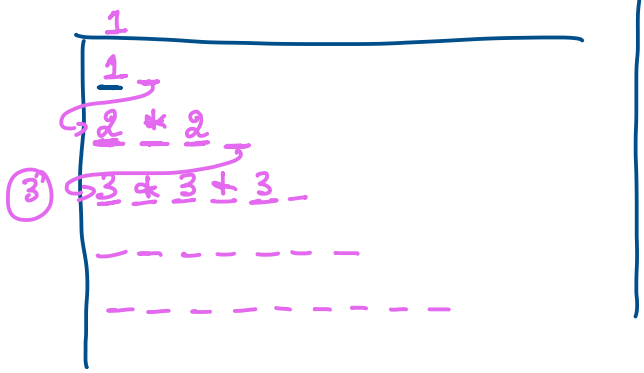
④

① 1
1 + 2 3



R.H.S.
row = 1






```
n = 5;
int place_holder = 1;
while (row <= n) {
    int place = 1;
    while (place <= ph) {
        if (place % 2 == 0) {
            Sysop("*");
        } else {
            Sysop(row);
        }
        place++;
    }
    Sysout();
    ph = ph + 2;
    row++;
}
```

(2)

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

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

```
int n = 4;
int row = 1;
int nst = 1;
int value = 1;
while (row <= n) {
    int cst = 1;
    while (cst <= nst) {
        Sysout(value);
        cst++
        value++;
    }
    Sysout()
    nst++;
    row++;
}
```

(3)

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

N = 5

row	spaces	nst
1	0	5
2	2	4
3	4	3
4	6	2

```
int n = 5;
int nsp = 0;
int nst = n;
row = 1;
while (row <= n) {
    int csp = 1;
    while (csp <= nsp) {
        Sysop(" ");
        csp++;
    }
    int cst = 1;
    while (cst <= nst) {
        Sysop("* ");
    }
}
```

5 | 8 | 1 |

cst++; // 6

nst--; // 3

nsp = nsp + 2; ✓ 2+2=4

Syso();

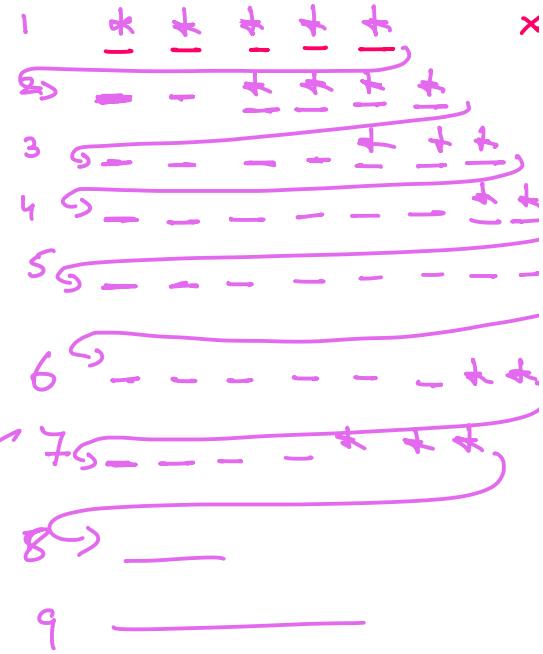
row++; // 3

N=5

row	spaces	stars
1	0	5
2	2	4 ✓
3	4	3
4	6	2
5	8	1
6	6/4	2/3
7		
8	2	4
9	0	5

```
int n=5; row=1
int nst=n;
int nsp=0;
while(row<=2*n-1){
    int csp=1;
    while(csp<=nsp){
        Sysop(" ");
        csp++;
    }
    int cst=1;
    while(cst<=nst){
        Sysop("*");
        cst++;
    }
    if(row<n){
        nsp=nsp+2;
        nst--;
    }else{
        nsp=nsp-2;
        nst++;
    }
    Syso();
    row++;
}
```

work



N = 4

start	row	spaces	inc v
1	1	3	1
2	2	2	2
3	3	1 ✓	3
4	4	0	4

```
int n = 4; row = 1;
int nsp = n - 1; //3
int incvalues = 1;
int decvalues = 0;
while (row <= n){
    int csp = 1;
    while (csp <= nsp){
        Syso(" ");
        csp++;
    }
    int value = row;
    int cst = 1;
    while (cst <= incvalues){
        Syso(value);
        value++;
        cst++;
    }
    value = value - 2;
    cst = 1;
    while (cst <= decvalues){
        Syso(value);
        value--;
        cst++;
    }
    Syso();
    nsp--;
    decvalues++;
    incvalues++;
    row++;
}
```