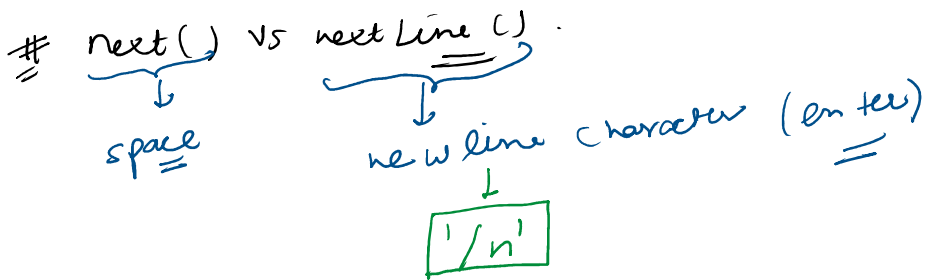


## Class 3: Nested Loops

Saturday, April 12, 2025 10:31 AM

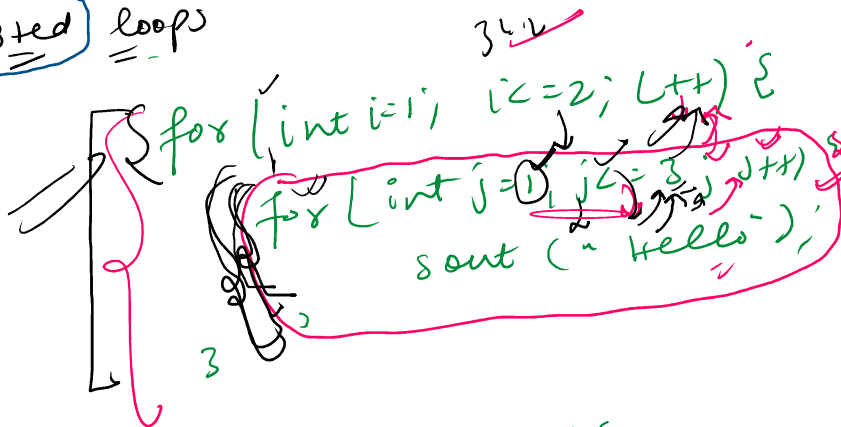
# next() vs nextLine()  
space      newline character (enter)  


# formatting a float output

System.out.printf("%.2f", f) → prints only up to 2 decimal places

# Nested loops

for (int i=1; i<=2; i++) {  
 for (int j=1; j<=3; j++) {  
 cout << "Hello";  
 }  
}



→ for (i=1; i<=2; i++) {  
 {  
 }  
}

i=1, j=1 H  
 i=1, j=2 H  
 i=1, j=3 H  
 i=2, j=1 H  
 i=2, j=2 H  
 i=2, j=3 H

3  
 3  
 3

# Pattern Printing

→ outer loop represents the number of rows in the pattern

★  
 ★ ★  
 ★ ★ ★

→ know try to establish a relationship between outer loop variable to the content to be printed in every row.

→ Inner loop will run based on this relationship

$i=1$   
 $i=2$   
 $i=3$

$1 \rightarrow *$   
 $2 \rightarrow * *$   
 $3 \rightarrow * * *$

$\rightarrow \text{for}(i=1; i \leq 3; i++)$   
 $\quad \text{for}(j=1; j \leq i; j++)$   
 $\quad \quad \text{cout} \ll (*);$   
 $\quad }$   
 $}$

8)

$1$   
 $1 \ 2$   
 $1 \ 2 \ 3$   
 $1 \ 2 \ 3 \ 4$   
 $1 \ 2 \ 3 \ 4 \ 5$

$n=5$

$1$   
 $1 \ 2$   
 $1 \ 2 \ 3$

$n=3$

9)

$5$   
 $5 \ 4$   
 $5 \ 4 \ 3$   
 $5 \ 4 \ 3 \ 2$   
 $5 \ 4 \ 3 \ 2 \ 1$

$i=1, 5$   
 $i=2, 5, 4$   
 $i=3, 5, 4, 3$   
 $i=4, 5, 4, 3, 2$   
 $i=5, 5, 4, 3, 2, 1$

$n$   
 $n = i + 1$   
 $5 - 3 + 1 = 3$   
 $5 - 5 + 1 = 1$

$\text{for}(j=n; j \geq (n-i+1);$

10)

$4$   
 $4 \ 3$

$n=4$

$n$  |  $i$  |  $\text{space}$  |  $\text{number}$   
 $1$  |  $1$  |  $1$  |  $1 \dots i+1$

Q)   
 - - - 4   
 - - 4 3   
 - 4 3 2   
 4 3 2 1

$n=4$

n	i	(space)	number
4	1	3	4
4	2	2	4 3
4	3	1	4 3 2
4	4	0	4 3 2 1

$$\begin{aligned} n-i+1 \\ 4-1+1 \\ 4-2+1 \\ 4-3+1=1 \end{aligned}$$

Q)   
 - - - #   
 - - # #   
 - # # #   
 # # # #

n	i	space	#
4	1	3 (n-i)	1
4	2	2 (n-i)	2
4	3	1	3
4	4	0	4

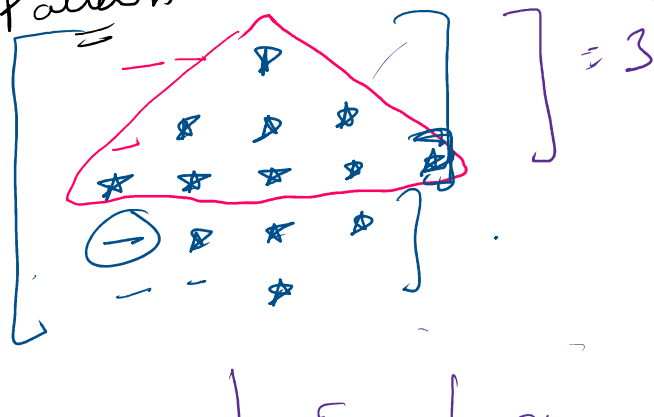
# ASCII values

'A'   
 65   
 'a'   
 97

→ 'A' - 'Z' [65-90]   
 - 'a' - 'z' [97-122]

# Diamond pattern

5



$$2n-2i+1$$

$$\frac{n}{2} \quad 2+1$$

n	i	S	S
2	1	1	3
2	2	3	1

n	i	S	sum
2	1	0	3
2	2	1	1

$i-1$

$2i-1$   
 $[2^{n-2i+1}]$

$\rightarrow 2 \times 0 - 2 \times 1 + 1$   
 $2 \times 2 - 2 \times 1 + 1 = 3$   
 $2 \times 2 - 2 \times 2 + 1 = 2$

# Switch case conditions

ex) [1, 2, 3, 4, 5, 6, 7]  
 [8-17]

n	i	S	sum
2	0	2	1
3	1	1	3
3	2	0	5

$(i-1)$

$\rightarrow 2i+1$

$2 \times 0 + 1 \Rightarrow 1$   
 $2 \times 1 + 1 \Rightarrow 3$   
 $2 \times 2 + 1 \Rightarrow 5$