



i	N	i ≤ N
1	4	1 ≤ 4
2	4	2 ≤ 4
3	4	3 ≤ 4
4	4	4 ≤ 4
5	4	5 ≤ 4 (False)

Sum(arr, n)

```

{
  int ans = 0;
  for(int i = 0; i < n; i++) {
    ans += arr[i];
  }
  return ans;
}

```

Time complexity analysis:

- `int ans = 0;`: 1 time
- `for(int i = 0; i < n; i++)`: N+1 times
- `ans += arr[i];`: N times
- `return ans;`: 1 time

i	N	i < N
0	4	0 < 4
1	4	1 < 4
2	4	2 < 4
3	4	3 < 4
4	4	4 < 4 (X)

$$Add = 1 + (n+1) + N + 1 = 2N + 3$$

Diagram illustrating the time complexity of a nested for loop:

```

int n = 4;
for(int i = 1; i ≤ n; i++) {
  for(int j = 1; j ≤ n; j++) {
    System.out.println(i + " " + j);
  }
}

```

Time complexity analysis:

- Outer loop: `for(int i = 1; i ≤ n; i++)` (N+1 times)
- Inner loop: `for(int j = 1; j ≤ n; j++)` (N times)
- Body: `System.out.println(i + " " + j);` (N × N times)

$$Add_2 = 1 + n + 1 + n^2 + n + n^2 = (2n^2 + 2n + 2)$$

i	N
1	4
2	
3	
4	
5	

$1 <= 4$
 $2 <= 4$
 $3 <= 4$
 $4 <= 4$
 $5 <= 4$

i	N	
0	4	$0 < 4$
1	4	$1 < 4$
2	4	$2 < 4$
3	4	$3 < 4$
4	4	$4 < 4$

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