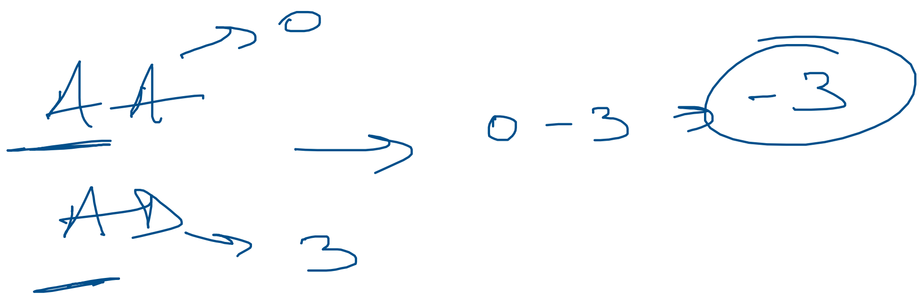
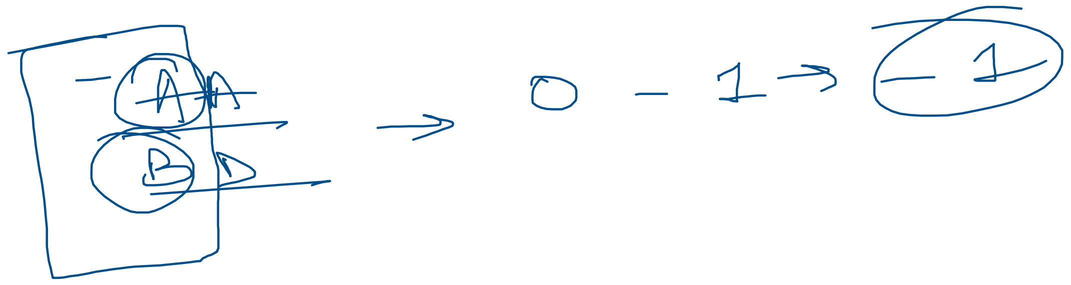
July - 14

14 July 2020 18:49

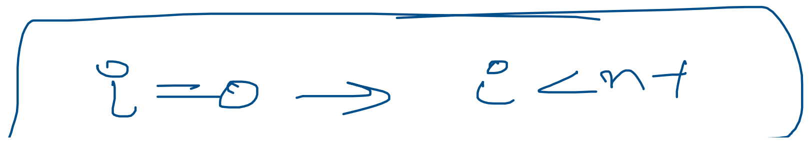
1. ~~Pending String~~ Functions ✓
2. Bubble Sort ✓
3. Recursion
4. Fibonacci
5. Binary Search

Tomorrow → Arrays

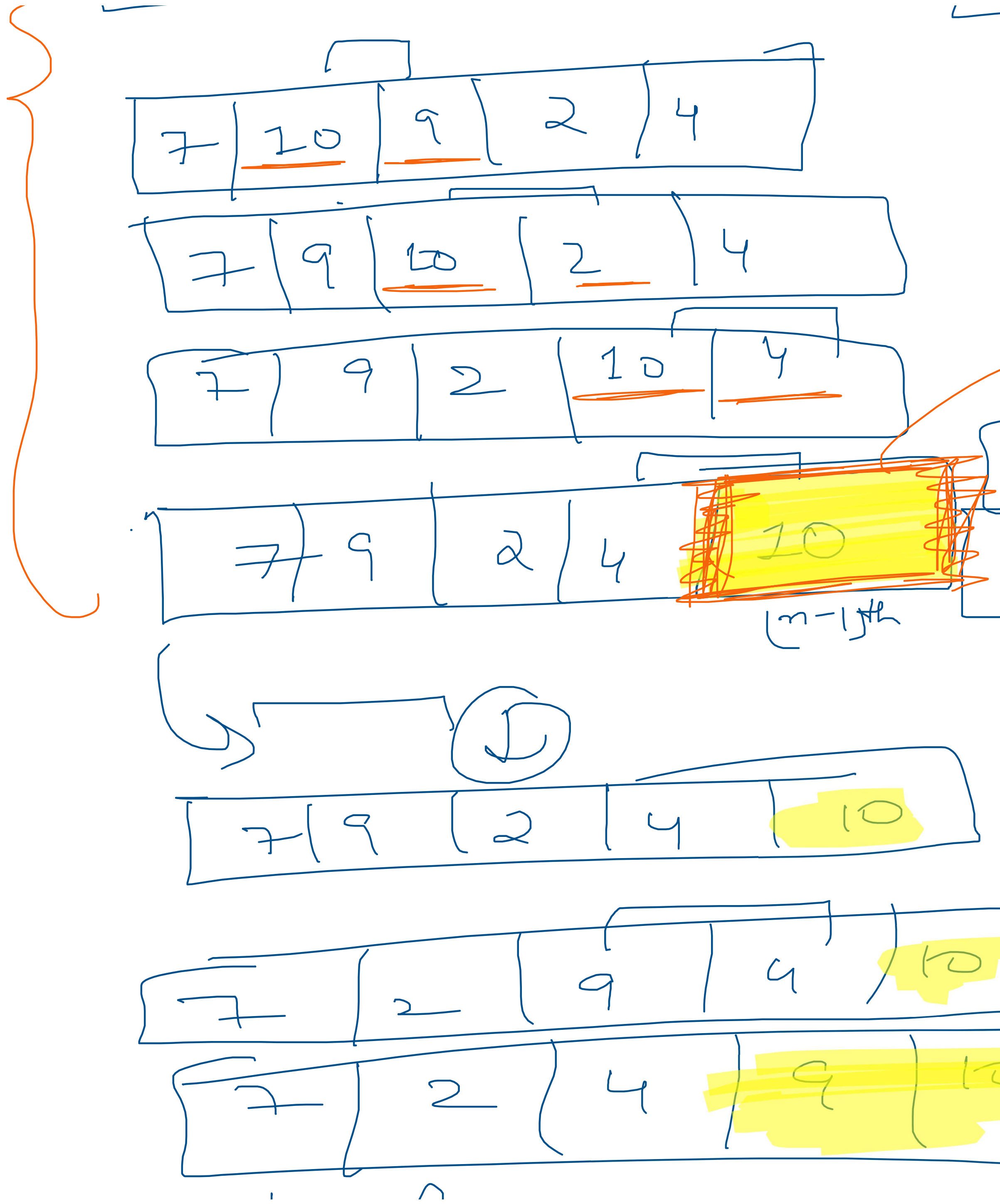




Bubble Sort



$j = 0 \rightarrow j < n-1$



1 Pass Completed

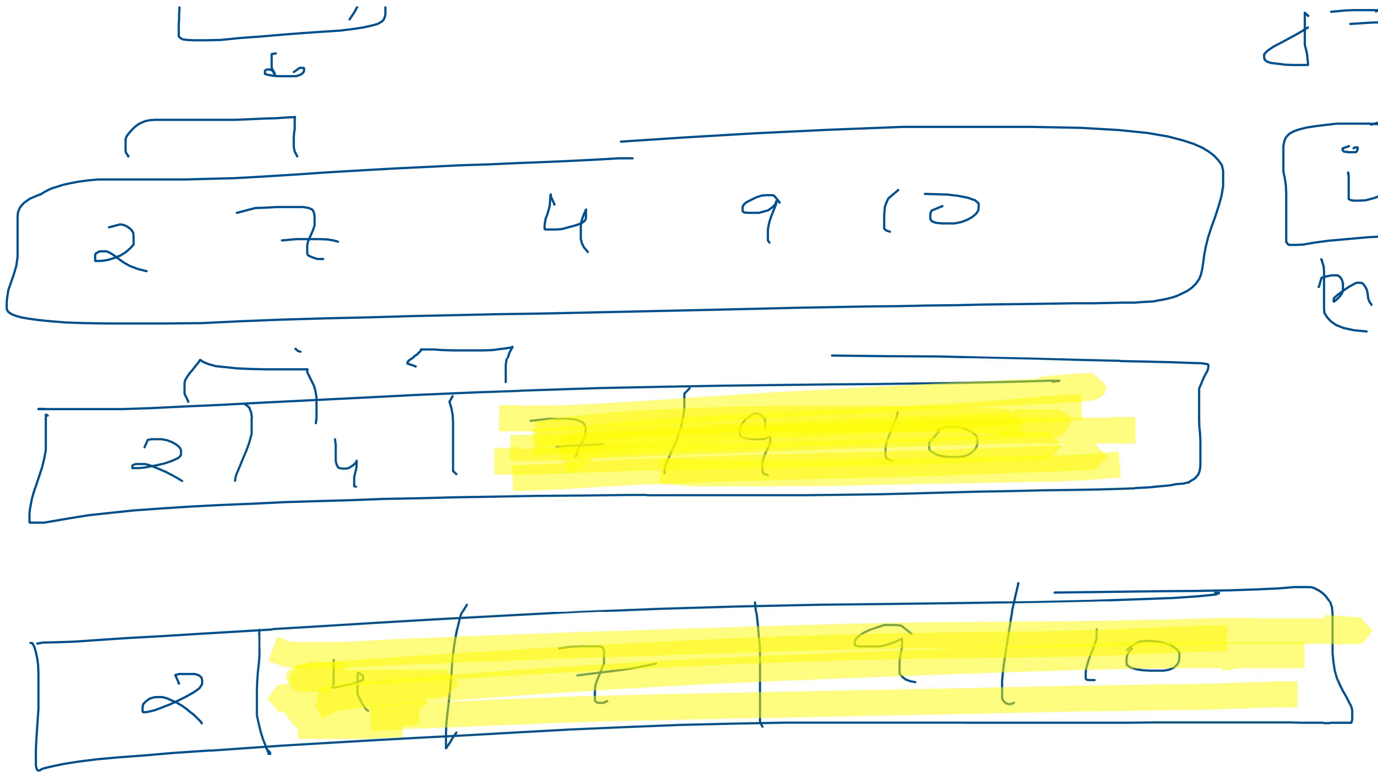
$i = 0$

last → (n-2)th (n-1)th

$i = 1$

last 1 (n-3) th & (n-2th) th index

$i \quad \rightarrow n-1-1$



$j = 0 \rightarrow n-1-$

$j = 0 \rightarrow n-1-2$

$\boxed{i = 2}$

$(n-4)$th & $(n-3)$rd

$i = 3$ last

$(n-5)$th & $(n-4)$th

```
for(int i=0; i<n-1; i++)
{ for(int j=0; j<n-1-i; j++)
  {
        arr[j] > arr[j+1]
      { int temp = arr[j];
```

```
            arr[j] = arr[j+1];
        }   arr[j+1] = temp;
    }
}
```

$\rightarrow O(n^2)$

Recursion

A function calling itself directly/indirectly.

Direct	Indirect

void fun()
{Base Condition
fun();
}
	void A()
	{ B();
	}
	void B()
	{ A();

}

Base Condⁿ / Terminating Condition

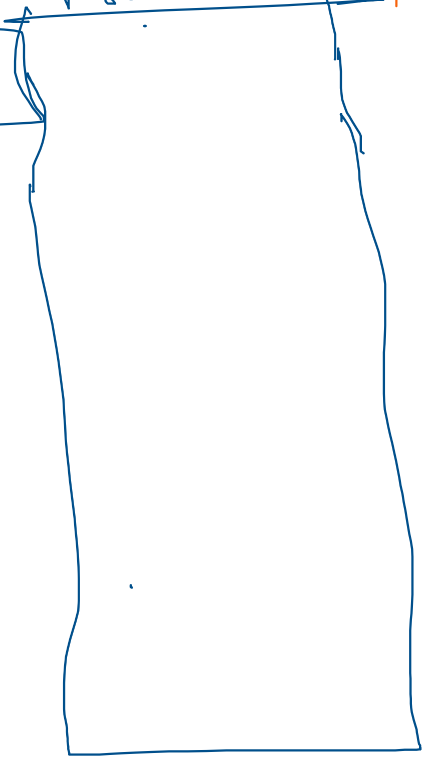
Example To print descending

fun(5)

5 4 3 2 1

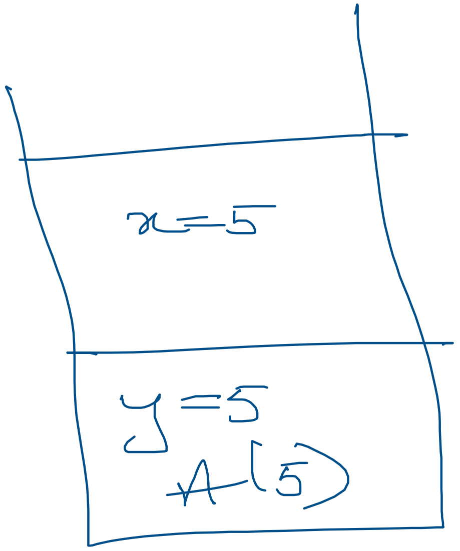
Print → 5 4

```
void fun (int n)
{
A   if (n==0) return;      Base
B   S.O.P (n);
C   fun(n-1);
}
```



Call By Value

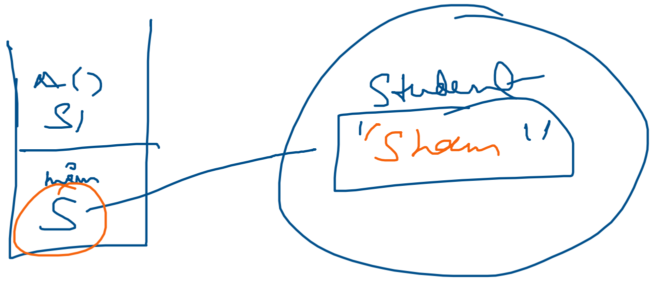
```
A(int x)
{

}
main()
{ int y = 5;
  A(y);
}
```



$\Rightarrow \therefore$ Call by Value

Copy of reference

```
A(Student s1)
{     s1.name = "Ram");
      s1 = null ;
}
```



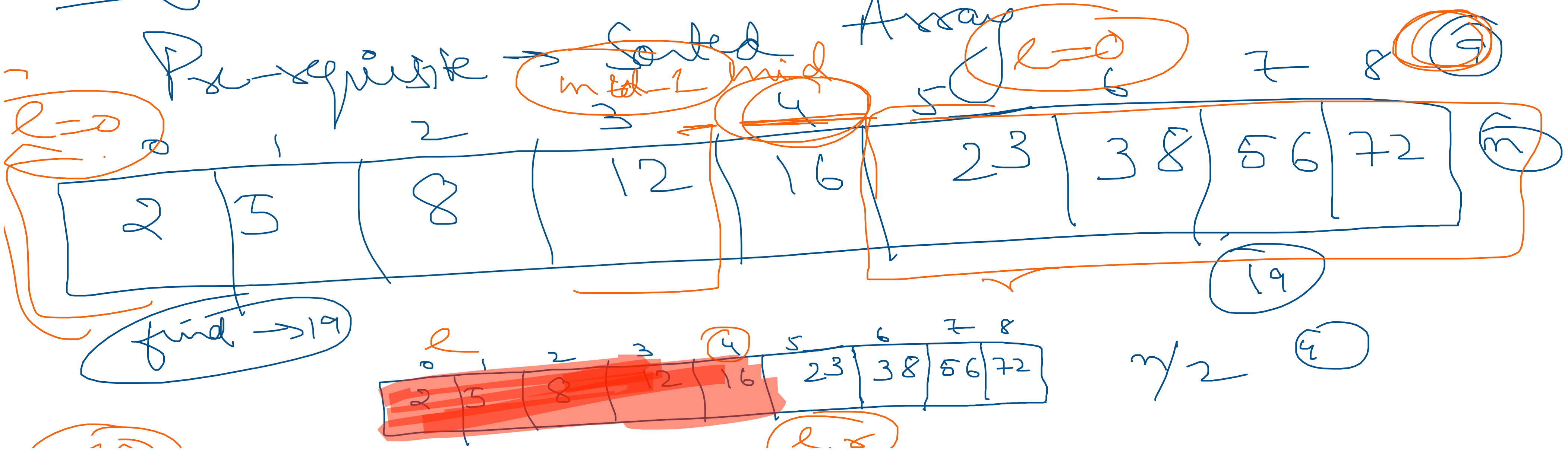
```
}
P.S.V main( )
{ Student S = new Student("Ram");
      A(S);
}
```

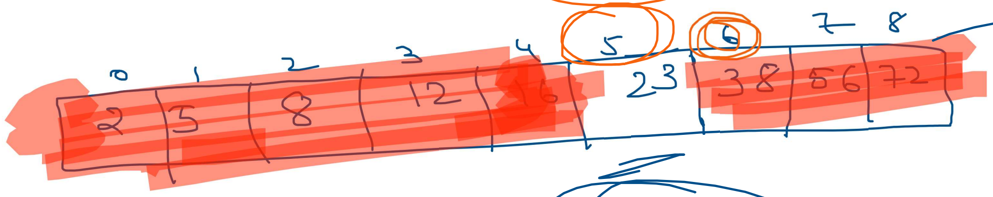
S.name

Java Supports Only Call by Value

Binary Search

Pre-requisite → Sorted Array



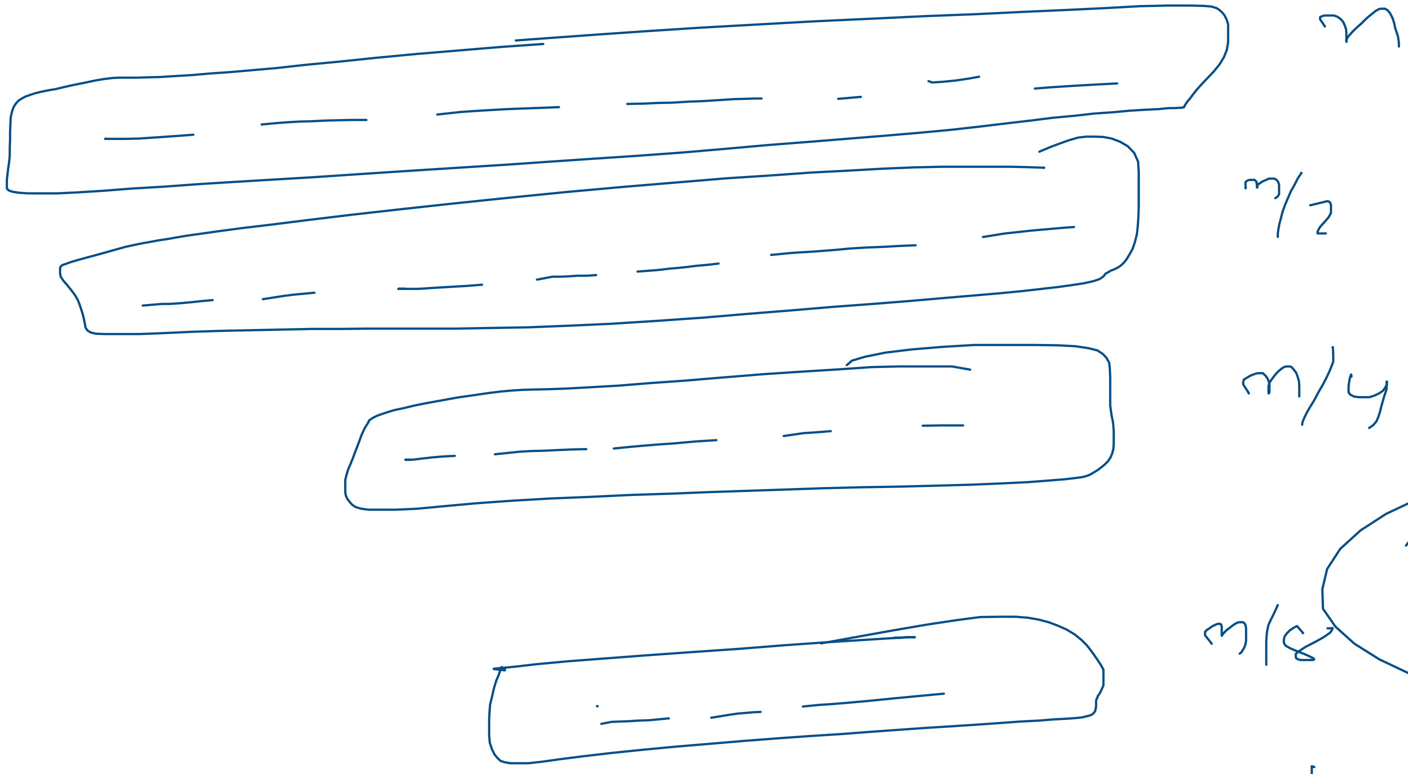


$\frac{n}{4}$ 2

$l = 5$

$r = 4$

$\frac{n}{8}$ $\rightarrow$ $l <= r$ ✓



Assume

k steps

Steps

$\boxed{1}$ $n/2^k$

for every step $O(1)$

$$\boxed{\to O(k)}$$

for worst case →

$$\frac{n}{2^k} = 1$$

$$2^k = n$$

$$\log_2(2^k) = \log(n)$$

$$k \log 2 = \log n$$

$$k = \frac{\log n}{\log 2} \quad \left(\frac{\log A}{\log B} \to \log_B A \right)$$

$$\boxed{k = \log_2 n}$$

$$\boxed{\mathbf{T.C} = O(n) = O(\log_2 n)}$$