

**Tutorial-1**  
**IIIT-DELHI**  
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**Que 1.**

We have discussed one to one Stable Marriage (SM) in class, can you think of its variations?

- a. Formulate a problem of one to many SM and how to solve it using Gale Shapley Algorithm (GS).
- b. Formulate a problem of many to many SM and how to solve it using Gale Shapley Algorithm (GS).
- c. In one to one SM both sides had the same number ( $n$  Men,  $n$  Women). What will be the number of entities on both sides now for part a and b?
- d. What would be the time complexity for a and b?

**Que 2.**

What is the time complexity of insertion in a Binary Search Tree (BST)?

**Que 3.**

**Time Complexity?**

```
void function(int n)
{
    int count = 0;

    // line 1
    for (int i=0; i<n; i++)

        // line 2
        for (int j=i; j< i*i; j++)
            if (j%i == 0)
            {
                // line 3
                for (int k=0; k<j; k++)
                    printf("*");
            }
}
```

**Que 4.**

Use the definition of Big-Oh to prove that  $n^{1+0.001}$  is not  $O(n)$ .

**Que 5.**

Given an array of  $n$  elements, where each element is at most  $k$  away from its target position, devise an algorithm that sorts the given array efficiently. What would be its time complexity?

Input : `arr[] = {6, 5, 3, 2, 8, 10, 9}`

`k = 3`

Output : `arr[] = {2, 3, 5, 6, 8, 9, 10}`

**Que 6.**

When  $n = 2^{2k}$  for some  $k \geq 0$ , the recurrence relation

$$T(n) = \sqrt{2} T(n/2) + \sqrt{n}, T(1) = 1$$

evaluates to?

**Que 7.**

**Apply Master's Theorem**

$$T(n) = 64 T(n/8) - n^2 \log n$$

**Que 8.**

**Apply Master's Theorem**

$$T(2^k) = 3T(2^{k-1}) + 1; T(1) = 1$$