Time Complexity

1. What is the time, and space complexity of the following code:

```
int a = 0, b = 0;
for (i = 0; i < N; i++) {
    a = a + rand();
}
for (j = 0; j < M; j++) {
    b = b + rand();
}
```

2. What is the time complexity of the following code:

```
int a = 0;
for (i = 0; i < N; i++) {
    for (j = N; j > i; j--) {
        a = a + i + j;
    }
}
```

3. What is the time complexity of the following code:
```
int i, j, k = 0;
for (i = n / 2; i <= n; i++) {
    for (j = 2; j <= n; j = j * 2) {
        k = k + n / 2;
    }
}
```

4. What is the time complexity of the following code :
```
void fun(int n)
{
    for (int i = 0; i < n / 2; i++)
        for (int j = 1; j + n / 2 <= n; j++)
            for (int k = 1; k <= n; k = k * 2)
                cout << "Prateek Jain";
}
```
(problem 5 to 10 each of the following recurrences, give an expression for the runtime T (n) if the recurrence can be solved with the Master Theorem.)

5. T (n) = 3T (n/3) + n/2

6. T (n) = 6T (n/3) + n^2log n

7. T (n) = 4T (n/2) + n/ log n

8. T (n) = 64T (n/8) − n^2log n

9. T (n) = 7T (n/3) + n^2

10. T (n) = 4T (n/2) + log n