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Pledge: "I pledge my honor that I have abided by the Stevens Honor System" – Himanshu Rana(hrana2)

Use the Master Theorem to find the complexity of each recurrence relation listed below.

1. $T(n) = T\left(\frac{n}{2}\right) + n^2$
   a = 1, b = 2, d = 2
   1 < 2^2
   Complexity: Θ(n^2)

2. $T(n) = 4T\left(\frac{n}{2}\right) + n^2$
   a = 4, b = 2, d = 2
   4 = 2^2
   Complexity: $\Theta(n^2 \log_2 n)$

3. $T(n) = 3T\left(\frac{n}{3}\right) + \sqrt{n}$
   a = 3, b = 3, d = ½
   3 > 3^(1/2)
   Complexity: $\Theta(n^{\log_3 3})$ = Θ(n)

For each function below, write the recurrence relation for its running time and then use the Master Theorem to find its complexity.

4.
```
int f(int arr[], int n) {
    if (n == 0) {
        return 0;
    }
    int sum = 0;
    for (int j = 0; j < n; ++j) {
        sum += arr[j];
    }
    return f(arr, n / 2) + sum + f(arr, n / 2);
}
```

   Recurrence: T(n) = 2T(n/2) + n
   a = 2, b = 2, d = 1
   2 = 2^1
   Complexity: $\Theta(n \log_2 n)$

5.
```
void g(int n, int arrA[], int arrB[]) {
    if (n == 0) {
        return;
    }
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < n; ++j) {
            arrB[j] += arrA[i];
        }
    }
    g(n / 2, arrA, arrB);
}
```

Recurrence: T(n) = T(n/2) + (n^2)

a = 1, b = 2, d = 2

1 < 2^2

Complexity: $\Theta(n^2)$