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Pledge: "I pledge my honor that I have abided by the Stevens Honor System"

Use the Master Theorem to find the asymptotic 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: $\theta(n^2)$

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, n=1/2
   3>3^1/2
   Complexity: $\theta\left(n^{log_3 3}\right) = \theta(n)$

For each function below, write the recurrence relation for its running time (with the correct asymptotic symbol for the *f(n)* part of the relation) 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) + $\theta(n)$
   a=2, b=2, n=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) + $\theta(n^2)$

a=1, b=2, d=2

1<2^2

Complexity: $\theta(n^2)$