Quiz 2

Time Complexity Notation

(True of False; 3 out of the followings are picked; each is 1 point)

1. $T(n) = n^2logn + n$ is $\Omega(n^2logn)$ -- True
2. $T(n) = n^2logn + n$ is $\Omega(n^3)$ -- False
3. $T(n) = n^2logn + n$ is $O(n^2logn)$ -- True
4. $T(n) = n^2logn + n$ is $\Theta(n^2logn)$ -- True
5. $T(n) = n^2logn + n$ is $\Theta(n^2)$ -- False
6. $T(n) = n^2logn + n$ is $O(n^3)$ -- True
7. $T(n) = n^2logn + n$ is $\Theta(n^3)$ -- False
8. $T(n) = n^2logn + n$ is $O(n^2)$ -- False
9. $T(n) = n^2logn + n$ is $\Omega(n^2)$ -- True

Basic Code Analysis

(2 points)

Version 1

What is the Big-Θ of the followin function?

```
foo(n, m):
    result = 0
    for (i = 1; i <= n; i++) {
       for (j = 1; j <= m; j++) {
           result += 1
       }
   }
   return result
```

Answer: $\Theta(mn)$

Version 2

What is the Big-Θ of the followin function?

```
foo(n):
    result = 0
    m = 100
    for (i = 1; i <= n; i++) {
       for (j = 1; j <= m; j++) {
           result += 1
       }
   }
   return result
```

Answer: $\Theta(n)$

Recurrence Definition

(True of False; 3 out of the followings are picked; each is 1 point)

1. $T(n) = 2n + 1$ is a recurrence. -- False
2. $T(n) = T(2n) + 1$ is a recurrence. -- False
3. $T(n) = 3T(\frac{n}{2}) + \Theta(n^2)$ is a recurrence. -- True
4. $T(n) = T(n-1) + n$ is a recurrence. -- True
5. $T(n) = T(n+1)$ is a recurrence. -- False

Find Recurrence

Write the recurrence of the following function. The variable i goes from 0 to n inclusively.

```
foo(n):
    for i = 0..n {
        foo(n/2)
    }
    foo(n/3)
```

Answer: $T(n) = (n+1)T(\frac{n}{2}) + T(\frac{n}{3})$