Recurrance

1. Solve the recurrence:

$$T(n) = 4T\left(\frac{n}{2}\right) + 1$$

2. Solve the recurrence:

$$T(n) = T(n/2) + n^2$$

First Principles

1. Prove that $5n - 3 \in \omega(\log n)$ using first principles

2. Prove that $3n\log n - n \in \Theta(n\log n)$ using first principles.

Runtime

1. Show that $\sqrt{n}\log n \in o(n)$

Code Analysis

1. Find the runtime of the following code:

```
foo(n):
while (n>1) {
    for i=1 to n
        print("x")
    n = n/2
}
```