

Joe Skimmons, Homework 1 written

1. Arranged by growth rate, slowest to fastest

$2/N$, 128 , $\log(N)$, \sqrt{N} , $23N$, $N \log(N)$, N^2 , $42N^3$, $2^N = 2^{(N+1)}$, 3^N , $N!$

2. (Day 1 correlates to $N=0$)

1. The fine on day N would be 2^{2^N} dollars

2. It would take $N = O(\log(\log(D)))$ days to reach D dollars

3. Run time for input of 5000:

a. Linear - 2.5 ms

b. $O(N \log N)$ - 3.08 ms

c. Quadratic - 12.5 ms

d. Cubic - 62.5 ms

4. In order to implement an $\text{insert}(x,k)$ method using immutable lists, every call to the method would result in a new list being made. The operation would:

1. Create a new list of size plus 1

2. Add all of the items up to index k (not including index k) in the new list

3. Add the new data, x , to the new list

4. Add everything from index k of the original list to the new list.

5. Discard the old list