

Homework 1

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(page 77, 2.1) Order the following functions by growth rate: $N, \sqrt{N}, N^{1.5}, N^2, N \log N, N \log(\log N), N (\log N)^2, N(\log(N^2)), 2/N, 2^N, 2^{N/2}, 37, N^2 \log N, N^3$.

- 1) 2^N
- 2) $2^{(n/2)}$
- 3) N^3
- 4) N^3
- 5) $N^2 \log(N)$
- 6) $N(\log(N))^2$
- 7) $N(\log(N^2))$
- 8) $N(\log(N))^2$
- 9) $N \log(N)$
- 10) $N \log(\log(N))$
- 11) $N^{1.5}$
- 12) $\text{Sqrt } n$
- 13) N
- 14) $2/N$

(page 78, 2.7a (1)-(4)): For each of the following six program fragments, give an analysis of the running time (Big-Oh will do):

(1) `sum = 0;`
 `For (i=0; i < n; ++i) ++sum;`

(2) `sum = 0;`
 `for (i=0; i < n; ++i)`
 `for (j=0; j < n; ++j) ++sum;`

(3) `sum = 0;`
 `for (i=0; i < n; ++i)`
 `for (j=0; j < n*n; ++j) ++sum;`

(4) `sum=0;`
 `for (i=0; i < n; ++i)`
 `for (j=0; j < i; ++j) ++sum;`