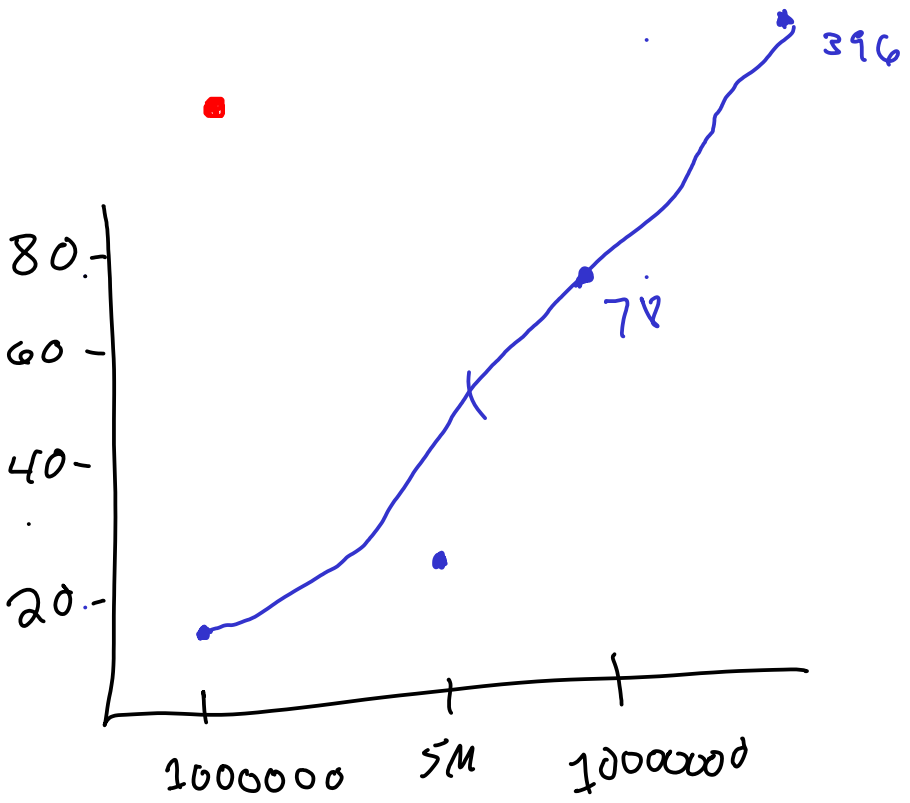


is_sorted_2

pseudocode

```
function is_sorted(A, n):
    for i ← 0 ... n-1:
        for j ← i+1 .. n-1:
            if A[i] > A[j]:
                return false
    return true
```

$n(n-i)$ ~ $n-i$

1 step = ~~2 accesses, 1 comparison~~ = 1 step

$x \le y \quad y \le z$

$x \le z$

```
function is_sorted(A, n):
    for i ← 0 ... n-2:
        if A[i] > A[i+1]:
            return false
    return true
```

$n-1$ steps

1 step

$f(n)$
$g(n)$

$f(n)$ is $O(g(n))$

iff

$\exists c > 0, k \geq 1. \ \forall n \geq k. \ cg(n) \geq f(n)$

exists

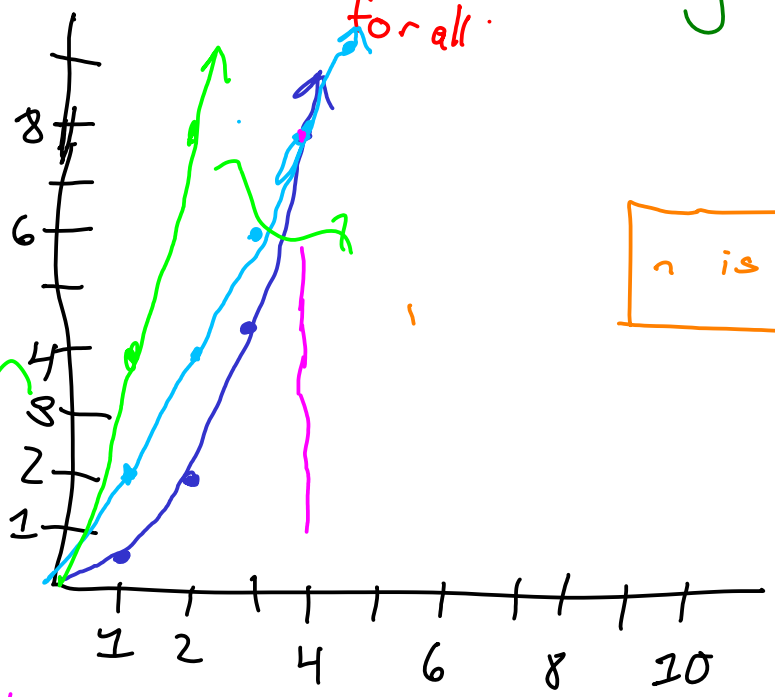
for all

$f(n) = \frac{x^2}{2}$

$g(n) = ~~2x~~$

~~x~~

10000



$g(n)$ is $O(f(n))$

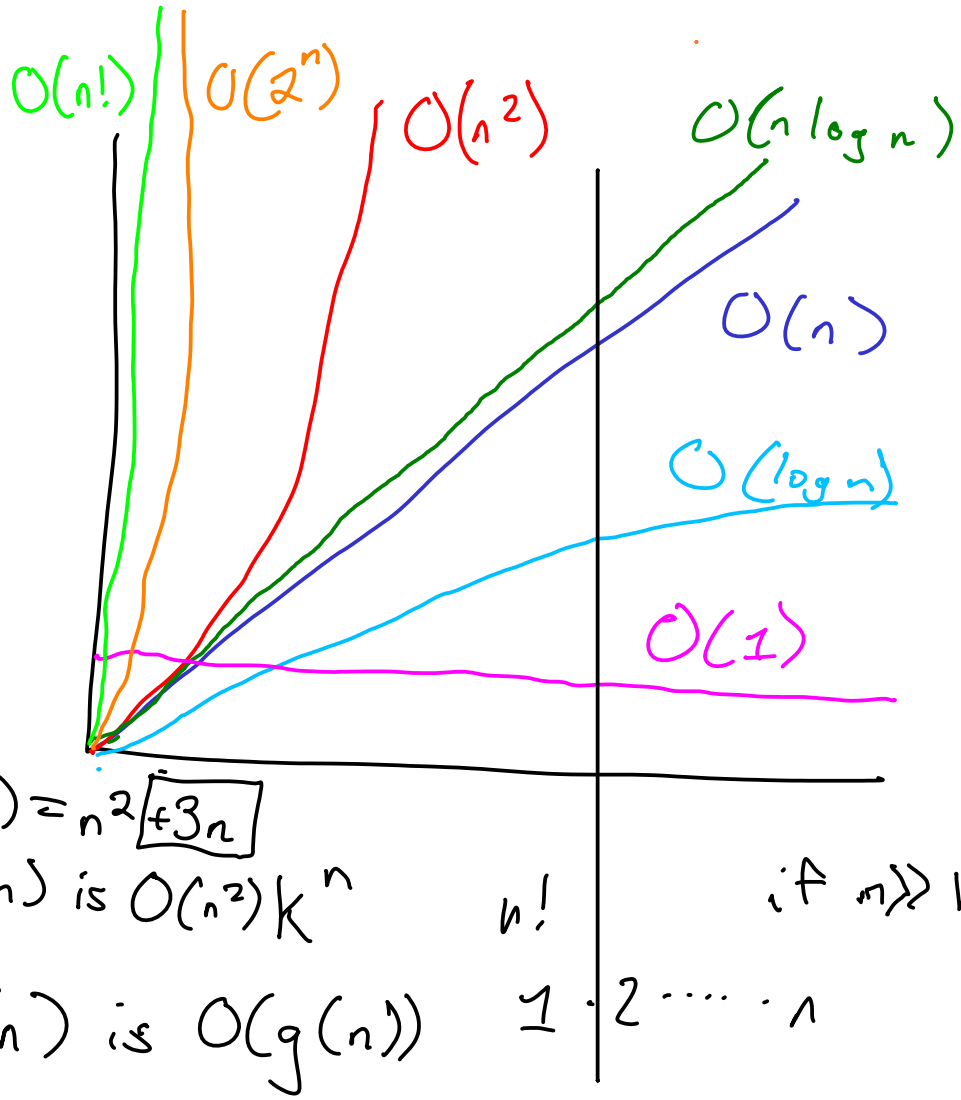
n is $O(n)$

$\exists c > 0, k \geq 1$.

1 4

$\forall n \geq 4. \ f(n) \geq g(n)$

$x \geq 4 \quad \frac{x^2}{2} > 2x$



$f(n) = n^2 + 3n$

$f(n)$ is $O(n^2)$ k^n if $n \gg k$

$n!$ $1 \cdot 2 \cdots n$

$f(n)$ is $O(g(n))$

$n^2 + 3n$ is $O(n^2)$

~~$n^2 + 3n \leq 2n^2$~~

$3n \leq n^2$

~~$n^2 + 2^n$ is $O(n^4)$~~

NO