

```

for i = 0 ... n-2:
  if A[i] > A[i+1]:
    return false
return true

```

$n$ : size of input

how long this takes??

$c$

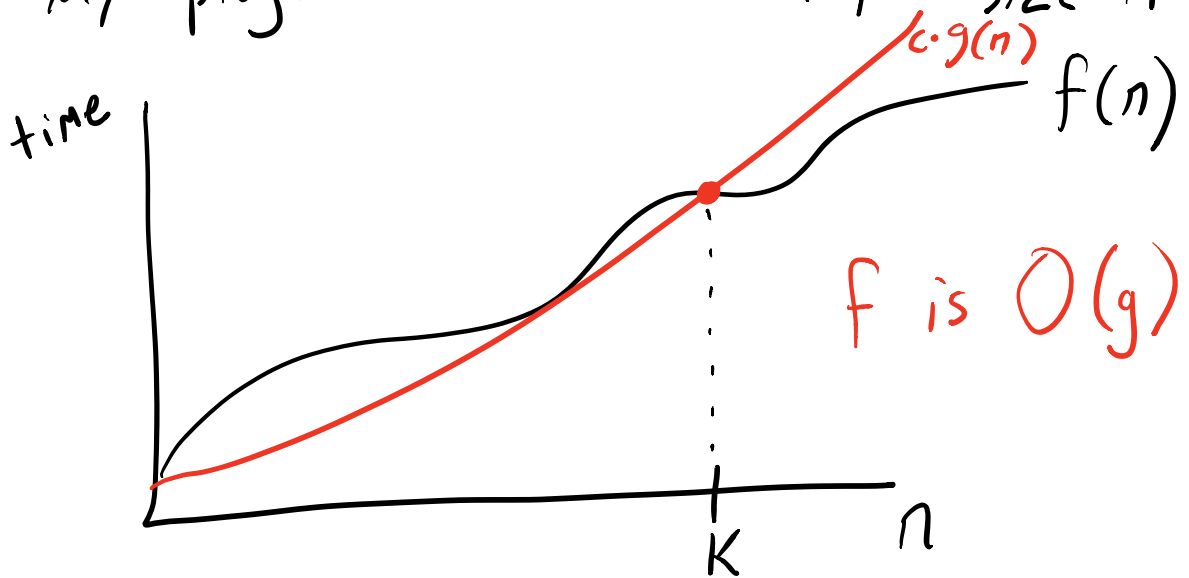
→ scales with  $n$

$$O(n)$$

$$n \cdot c$$

$$O(n^2)$$

Suppose  $f(n)$  is how long my program runs on input size  $n$



$f$  is  $O(g) \equiv$

*there exists*  $\exists c, k > 0$  such that

*for all*  $\forall n \geq k \quad f(n) \leq c \cdot g(n)$

$$f(n) = 2n^2 \quad O(n^2)$$

$$g(n) = n^2$$

$$c = 3 \quad k = 1$$

$$3 \cdot n^2 \geq 2n^2 \quad \forall n \geq 1$$

$$f(n) = 10n^2 + 100n + 1000 \quad O(n^2)$$

$$c = 1000$$

$$k = 10$$

$$f(k) = 3000$$

$$c \cdot g(k) = 100000$$

$$c = 11$$
$$K = 120$$

$$f(n) = n^2 \quad g(n) = n$$

is  $f \in O(g)$ ?

