Pseudocode

1000 sets + 2000 gets + 1000 compares
+ 1 return

```
Function isSorted (array, size):
    For i From 0 To size -2:
        If array[i] > array[i+1]:
            Return False
    Return True
End Function
```

$\} \; 1 \text{ step}$

$\} \; O(\text{size})$

size = n

```
Function isSorted (array, size)
    For i From 0 To size -1:
        For j From i+1 To size-1:
            If array[i] > array[j]
                Return False
    Return True
End Function
```

$\} \; 1 \text{ step}$

$0+1+2+\cdots+n$

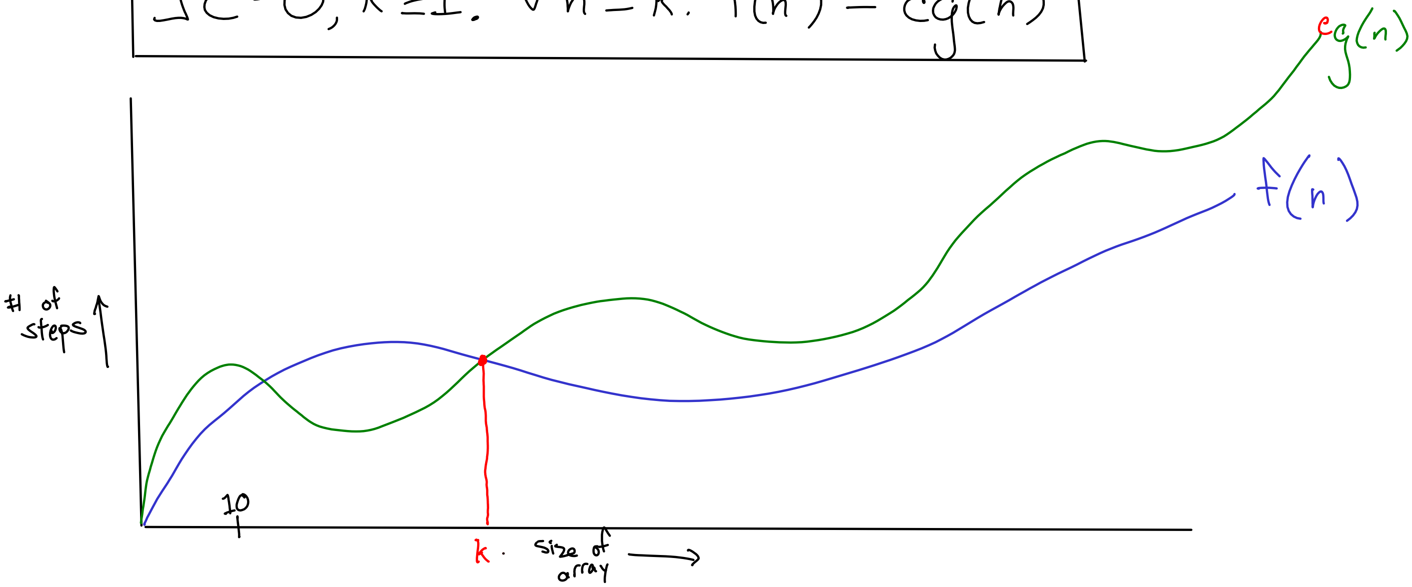
$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

$$\boxed{\frac{n^2+n}{2} \text{ is } O(n^2)}$$

$O(n)$: "proportional to n"

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

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



$\frac{n^2+n}{2}$ is $O(n^2)$ $\qquad$ $f(n)$ $\qquad$ $g(n)$

$$\exists c > 0,\ k \geq 1.\ \forall n \geq k.\ \frac{n^2+n}{2} \leq cn^2$$

Let $c=5$. $\therefore$ Then it is enough to show that

$$\exists k \geq 1.\ \forall n \geq k.\ \frac{n^2+n}{2} \leq 5n^2$$

Let $k=10$. Then it is enough to show that

$$\forall n \geq 10.\ \frac{n^2+n}{2} \leq 5n^2$$

$$\forall n \geq 10.\ \frac{n^2}{2} + \frac{n}{2} \leq 5n^2$$

$$\forall n \geq 10.\ \frac{n}{\cancel{2}} \leq \frac{9}{\cancel{2}} n^2$$

$$\forall n \geq 10\ \ n \leq 9n^2$$

$$\forall n \geq 10.\ 1 \leq 9n$$

$$\frac{n^2+n}{2} \text{ is } O(n^2)$$

$$\exists c>0,\ k\geq 1.\ \forall n\geq k.\ \frac{n^2+n}{2} \leq cn^2$$

$\forall n \geq 2.\ 2 \leq n$

n positive

$\forall n \geq 2.\ 2n \leq n^2$

$\forall n \geq 2.\ \frac{n}{2} \leq \frac{n^2}{4}$

$\forall n \geq 2.\ 1 \leq 1$

$\forall n \geq 2.\ n^2 \leq n^2$

$\forall n \geq 2.\ \frac{n^2}{2} \leq \frac{n^2}{2}$

$\boxed{\text{If } a \leq c \text{ and } b \leq d \text{ then } a+b \leq c+d}$

$\forall n \geq 2.\ \frac{n}{2} + \frac{n^2}{2} \leq \frac{n^2}{4} + \frac{n^2}{2}$

$\forall n \geq 2.\ \frac{n^2+n}{2} \leq \frac{3n^2}{4}$

$\exists c>0.\ \forall n \geq 2.\ \frac{n^2+n}{2} \leq cn^2$

$\exists c>0,\ k\geq 1.\ \forall n \geq k.\ \frac{n^2+n}{2} \leq cn^2$

$\frac{n^2+n}{2}$ is $O(n^2)$