Don't write f(n) = O(g(n))

The notation $O(g(n))$ denotes a set of functions. Therefore, we write

$f(n)$ is in $O(g(n))$ or $f(n) \in O(g(n))$.

But some books and research articles use the notation

$f(n) = O(g(n))$

Don't ever do that! And, if you see a book or website using that notation, stop using to that book or website.

Using equality = instead of membership $\in$ can lead to proving things that are false. Here's an example.

We know that $n+2 \in O(n)$ and $n+3 \in O(n)$. Let's write these as equalities instead:

(1) $n+2 = O(n)$
(2) $n+3 = O(n)$

But transitivity of equality then allows us to conclude that

$n+2 = n+3$ and
$2 = 3$

Obviously these are false, but we proved them from equalities (1) and (2).

Therefore, never write: $f(n) = O(g(n))$.