

2 Comparing Relative Order-of-Growth Of Two Functions

1. 3
2. 2
3. 2
4. 2
5. 2
6. 3
7. 2
8. 2
9. 2
10. 1

3 Asymptotics

1. No, $f(n) = O(n^2)$ only means that the function $f(n)$ is bounded from above by some iteration of the function $g(n) = n^2$, but it is possible that the function $f(n)$ is also bounded from above by an iteration of the function $h(n) = n$.
2. No, while it is true that a function that is $O(n)$ is also $O(n^2)$, a function that is $O(n^2)$ is not necessarily $O(n)$. For example, the function $f(n) = n^2$ is $O(n^2)$ for all inputs and never $O(n)$.
3. No, the designation $\Theta(n^2)$ only describes the worst case scenario but there may exist scenarios in which the algorithm performs better.
4. Yes, if an algorithm is $\Theta(n^2)$ then there is at least one scenario in which it performs at that speed which means it cannot perform better for all inputs.
5. Yes, because $f(n) = O(n^2)$ and $f(n) = \Omega(n^2)$.