Asymptotic Notation Simplified

For two functions, f and g, ...

$$f = O(g) \iff \text{“}f \leq g\text{”}$$

..."f is 'big oh' of g" means the growth rate of f is less than or equal to the growth rate of g.
Said differently, it means f is eventually always smaller than or within a constant multiple of g.

$$f = \Omega(g) \iff \text{“}f \geq g\text{”}$$

..."f is 'big omega' of g" means the growth rate of f is greater than or equal to the growth rate of g.
Said differently, it means f is eventually always larger than or within a constant multiple of g.

$$f = \Theta(g) \iff \text{“}f \approx g\text{”}$$

..."f is 'big theta' of g" means f is in "big oh" *and* "big omega" of g, which means f and g have the same growth rate. Said differently, it means f is eventually always within a constant multiple of g.

$$f = o(g) \iff \text{“}f < g\text{”}$$

..."f is 'little oh' of g" means the growth rate of f is strictly less than the growth rate of g.
Said differently, it means f is eventually always smaller than g, even considering constant multiples.

$$f = \omega(g) \iff \text{“}f > g\text{”}$$

..."f is 'little omega' of g" means the growth rate of f is strictly greater than the growth rate of g.
Said differently, it means f is eventually always larger than g, even considering constant multiples.

There's no "little theta" notation that combines "little oh" *and* "little omega" because f cannot be both less than *and* greater than g. In other words, "little theta" of anything would be the empty set.

Don't fuss the format. All the variants below are used interchangeably for all 5 symbols:

$$f = O(g),\ f \in O(g),\ f(x) = O(g(x)),\ f \text{ is } O(g),\ f \text{ is in } O(g)$$