

# Exercise answers - Chapter 3 - Growth of functions

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## Exercise 3.1-1

Defining  $h(n) = \max(f(n), g(n))$ . Since  $f$  and  $g$  are asymptotically, non-negative it holds that,  $f(n) + g(n) \leq 2h(n)$  and  $f(n) + g(n) \geq h(n)$  for all  $n > n_0$ , for some  $n_0$ . So, we have,

$$\frac{1}{2}(f(n) + g(n)) \leq h(n) \leq f(n) + g(n) \quad \forall n > n_0$$

which ensures that  $h(n)$  is a member of  $\Theta(f(n) + g(n))$ , with constants  $c_1 = 1/2$  and  $c_2 = 1$ .