## Exercises first lecture

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**Ex.1**

$$g_1 = f_1, g_2 = f_5, g_3 = f_3, g_4 = f_8, g_5 = f_4, g_6 = f_2, g_7 = f_7, g_8 = f_6$$

**Ex.2**

1. Sometimes it is true. For example it is true for $f(n) = n$ (but basically for any function that tends to infinite for $n$ tending to infinite). Instead, it is not true for example for $f(n) = \frac{1}{n}$.
2. Always true. Knowing that the two functions are asymptotically nonnegative, we know for sure that their sum will never be smaller than their max or larger than twice their max.
3. Always true for similar reasons as above: asymptotically $c_1 = 1, c_2 = 2$ can be used as constants to bound $f + O(f)$ with $f$.
4. Sometimes true. For example for $f(n) = n^2, g(n) = n$ it is not true, while for $f(n) = n^2 + n, g(n) = n^2$ it is true.
5. Sometimes true. For example it is not true for $f(n) = n^2, g(n) = n$, but it is true for $f(n) = n|\sin n|, g(n) = n|\cos n|$.