TCSS 343 - Week 1

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1.

$$2 \cdot \max\{f(n), g(n)\} \geqslant f(n) + g(n)$$
$$\max\{f(n), g(n)\} \geqslant \frac{1}{2} \cdot (f(n) + g(n))$$

Which allows us to say:

$$\frac{1}{2} \cdot (f(n) + g(n)) \geqslant \max\{f(n), g(n)\} \geqslant f(n) + g(n)$$

4. Consider $f(n)+g(n)$ where $g(n) \in O(f(n))$ and let c be a constant such that $0 \leqslant g(n) < c \cdot f(n)$ for large enough n. Then $f(n) \leqslant f(n)+g(n) \leqslant (1+c)f(n)$ for large enough n.

5. Only sometimes true. For the case $f(n) = n$ this is true but for the case $f(n) = \frac{1}{n}$ the statement is false.