

Mějme  $f, g : \mathbb{N} \rightarrow \mathbb{R}^+$ . Dokažte nebo vyvrátte:

1.  $n^2 = O(n^3)$
2.  $n^3 = O(n^2)$
3.  $f = O(g) \implies g = O(f)$
4.  $f = O(g) \implies g = \Omega(f)$
5.  $f = \Theta(g) \implies g = O(f)$
6.  $f = O(g) \implies \frac{1}{f} = O(g)$
7.  $f = O(g) \implies \frac{1}{f} = O(\frac{1}{g})$
8.  $f = O(g) \vee g = O(f)$
9.  $f_1 = O(g) \wedge f_2 = O(g) \implies f_1 + f_2 = O(g)$

### **Definice**

$$\begin{aligned} f = O(g) &\iff \exists c > 0, \exists n_0 : \forall n > n_0 : f(n) \leq c \cdot g(n). \\ f = \Omega(g) &\iff \exists c > 0, \exists n_0 : \forall n > n_0 : f(n) \geq c \cdot g(n). \\ f = \Theta(g) &\iff f = O(g) \wedge f = \Omega(g). \end{aligned}$$