$$\exists n_0 : \forall n \geq n_0, f(n) > 0.$$

$$\Theta(g(n)) = \{f(n) \mid \exists c_1, c_2 > 0, \exists n_0 : \forall n \geq n_0, 0 \leq c_1.g(n) \leq f(n) \leq c_2.g(n)\}$$

$f(n) = 1/2 * n^2 - 3n$, $g(n) = n^2$, $f(n) \in \theta(g(n))$?

$0 \leqslant c_1 * n^2 \leqslant 1/2 * n^2 - 3n \leqslant c_2 * n^2$

$0 \leqslant c_1 * n^2$

$c_1 * n^2 \leqslant 1/2 * n^2 - 3 * n$ делим на n^2
$1/2 * n^2 - 3 * n \leqslant c_2 * n^2$ делим на n^2

$c_1 \leqslant 1/2 - 3/n$
$1/2 - 3/n \leqslant c_2$

$c_2 = 1234567$

$n \geqslant 7 \implies 1/2 - 3/7 = 1/14$
$c_1 \leqslant 1/14$

$c_1 = 1/15$

$n_0 = 10,\ c_1 = 1/15,\ c_2 = 1234567$

$$\Theta(g(n)) = \{f(n) \mid \exists c_1, c_2 > 0,\ \exists n_0 :\ \forall n \geq n_0,\ 0 \leq c_1.g(n) \leq f(n) \leq c_2.g(n)\}$$

$$O(g(n)) = \{f(n) \mid \exists c > 0,\ \exists n_0 :\ \forall n \geq n_0,\ 0 \leq f(n) \leq c.g(n)\}$$

$$\Omega(g(n)) = \{f(n) \mid \exists c > 0,\ \exists n_0 :\ \forall n \geq n_0,\ 0 \leq c.g(n) \leq f(n)\}$$

$$o(g(n)) = \{f(n) \mid \forall c > 0,\ \exists n_0 :\ \forall n \geq n_0,\ 0 \leq f(n) < c.g(n)\}$$

$$\omega(g(n)) = \{f(n) \mid \forall c > 0,\ \exists n_0 :\ \forall n \geq n_0,\ 0 \leq c.g(n) < f(n)\}$$

$$f(n) \asymp g(n) \quad \Leftrightarrow \quad f(n) = \Theta(g(n))$$

$$f(n) \preceq g(n) \quad \Leftrightarrow \quad f(n) = O(g(n))$$

$$f(n) \prec g(n) \quad \Leftrightarrow \quad f(n) = o(g(n))$$

$$f(n) \succeq g(n) \quad \Leftrightarrow \quad f(n) = \Omega(g(n))$$

$$f(n) \succ g(n) \quad \Leftrightarrow \quad f(n) = \omega(g(n))$$

$f(n) + g(n) \asymp max(f(n),\ g(n))$

$$a * max(f(n),\ g(n)) \ \leqslant\ f(n)\ +\ g(n)\ \leqslant\ b * * max(f(n),\ g(n))$$

$$max(f(n),\ g(n)) \ \leqslant\ f(n) + g(n) \ \leqslant\ max(f(n),\ g(n))\ +\ max(f(n),\ g(n))$$
$$1 * max(f(n),\ g(n)) \ \leqslant\ f(n) + g(n) \ \leqslant\ 2 * max(f(n),\ g(n))$$

$$no = max(nf_0, ng_0)$$