ciselne obory
$\mathbb{N}, \mathbb{N}_0, \mathbb{Z}, \mathbb{Q}, \mathbb{R}$
castecne usporadana mnozina

- reflexe
- antisymetre
- tranzitivita

priklad 1
$x, y \subseteq \mathbb{R}$:

- $\forall x \in X \forall y \in Y x \leq y$ $(x < 0 < y)$
- $\exists x \in X \exists y \in Y x \leq y$ (x=y=0)
- $\exists x \in X \forall y \in Y x \leq y$ $(min(x) \leq min(y))$
- $\forall x \in X \exists y \in Y x \leq y$ $(max(x) \leq max(y))$
- $\forall y \in Y \exists x \in X x \leq y$ $(min(x) \leq min(y))$
- $\exists y \in Y \forall x \in X x \leq y$ $(max(x) \leq max(y))$

omezenost
$X \subseteq \mathbb{R}$ je omezena $<=>$ $\exists y \in \mathbb{R}^+ \forall x \in X : -y \leq x \leq y$

jednoznacnost
$f \subseteq XxY$
$\forall x \in X \exists! y \in Y : f(x) = y$

omezenost funkce
maximum $\neq$ shora omezena (napr otevreny interval)

priklad 2
$X \subseteq \mathbb{R} : \exists a, b, c \in \mathbb{R} \forall x, y \in \mathbb{X}, \in \mathbb{R}(x \neq y) => (a < x \& y < b \& |x - y| < c)$
omezena zdola, zhora, c=a+b

HW
$X \subseteq \mathbb{R}$: nekonecna t. ze
$\exists a, b, c \in \mathbb{R} : c > 0 \& \forall x, y \in \mathbb{X}, \in \mathbb{R}(x \neq y) => (a < x \& y < b \& |x - y| > c)$
... interval to nebude

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dukaz ze $\sqrt{2}$ neni racionalni

dukaz ze $k \in \mathbb{N}$
$\mathbb{N}^k \quad (\mathbb{N} * \mathbb{N} * ... * \mathbb{N})$
je spocetna mnozina

$\forall a, b, \in \mathbb{R} : (a < b) \rightarrow (\exists c \in \mathbb{Q} : a < c < b)$

hledani suprema, infima a zjistovani min a max nejake mnoziny
$A = \{\frac{1}{n}, n \in \mathbb{N}\}$ sup=1, inf=0
$B = \{q \in \mathbb{Q} : q^2 < 2\}$ sup= $\sqrt{2}$, inf= $-\sqrt{2}$
$C = \{0.3, 0.33, 0.333...1/3\}$ sup=1/3, inf=0,3

sjednocovani suprema a infima
necht: $sup(A) = a$, $sup(B) = b$
$sup(A \cup B) = max(a, b)$
$sup(A \cap B) = min(a, b)$ pokud $A \cap B \neq \emptyset$

$sup(A+B) = (a+b)$
$sup(A-B) = sup(A) - inf(B)$

AG nerovnost
$a_1, ...a_n\ in\mathbb{R}^+ : \frac{a_1,...a_n}{n} \geq \sqrt[n]{a_1 * .. * a_n}$

ulohy:
$A = \{q \in \mathbb{Q} | q < \sqrt{3}\}$ sup= $\sqrt{3}$, inf= $-\infty$
$B = \{sin\ x | x \in (0, 2\pi)\}$ sup= 1, inf= -1
$C = \{\frac{n-1}{n} | n \in \mathbb{Z}\backslash\{0\}\}$ sup= 2, inf= 0