Partial Order: $\forall x, y, z \in A$: Reflexive: $x\mathcal{R}x$, Anti-symmetric: $x\mathcal{R}y, y\mathcal{R}x \implies x = y$, Transitive: $x\mathcal{R}y, y\mathcal{R}z \implies x\mathcal{R}z$. **Total:** $\forall x, y \in A, x\mathcal{R}y \vee y\mathcal{R}x$

Equivalence Relation: $\forall x, y, z \in A$: Reflexive: $x\mathcal{R}x$, Symmetric: $x\mathcal{R}y = y\mathcal{R}x$, Transitive: $x\mathcal{R}y, y\mathcal{R}z \implies x\mathcal{R}z$. **Eq. Class:** $[x] := \{y \in A : x \sim y\}$

Induction: Base step: (i) *P_1 is true.* **Inductive Hypothesis:** (ii) *Assume P_n is true for some $n \in \mathbb{N}$. Prove P_{n+1} is true.* Then, P_n is true $\forall n \in \mathbb{N}$.

Ordered Fields: A field with a partial order $(\leq)$ s.t.: (i) If $x, y, z \in \mathbb{F},\ x < y \implies x + z < x + y$, (ii) $x, y \in \mathbb{F},\ x, y > 0 \implies xy > 0$

Algebraic Number: a is algebraic if it solves $c_n x^n + \cdots + c_1 x + c_0 = 0$ for some $n \in \mathbb{N}, c_0, c_n \in \mathbb{Z}, c_n \neq 0$ (e.g. $\sqrt[n]{2}$. ***Note:*** $\mathbb{Q} \subset \{algebraic\ numbers\}$)

RZT: *Suppose $c_0, \cdots, c_n \in \mathbb{Z},\ r \in \mathbb{Q}$ satisfies $c_n r^n + \cdots + c_1 r + c_0 = 0$ for some $n \in \mathbb{N},\ c_n \neq 0$. Let $r = \frac{c}{d}, c, d \in \mathbb{Z}, d \neq 0$, be coprime. Then $c,\ d$ divides c_0, c_n.*

LUBP: Given $A \in \mathbb{E}$ where $\mathbb{E}$ is an ordered field, $\exists \sup A \in \mathbb{E} \iff A \neq \emptyset, A \subseteq \mathbb{E}$, A is bounded above. $\sup A := \alpha,\ \exists \alpha, \beta \in \mathbb{E}$ s.t. $\forall a \in A,\ a \leq \alpha \leq \beta$.

GLBP: Given $A \in \mathbb{E}$ where $\mathbb{E}$ is an ordered field, $\exists \sup A \in \mathbb{E} \iff A \neq \emptyset, A \subseteq \mathbb{E}$, A is bounded below. $\inf A := \alpha,\ \exists \alpha, \beta \in \mathbb{E}$ s.t. $\forall a \in A,\ a \leq \beta \leq \alpha$.