
Iudology Documentation

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Note: We use the term Game (capital G) to refer to a mathematical object defined below, and the term game (lower case) to refer to particular games such as Amazons, Domineering, or Hackenbush.

This package is for the study of Games, mathematical abstractions for the analysis of partizan games.

A partizan game is one such that:

- there are two players, Left and Right, who alternate turns
- there are no random elements (dice, shuffled cards, etc)
- there is no sequence of play which causes the state of the game to repeat
- if it is a player's turn and they are unable to move, they lose

GAMES

A Game G is defined as two sets of Games, a left set and a right set, and is typically denoted:

$$G = \mathcal{D}$$

where \mathcal{D} denotes a typical member of the left set and \mathcal{D} denotes a typical member of the right set. A Game represents the current state of a game, where the left set consists of the possible game states the Left player can transition the game to, while the right set consists of the possible game states the Right player can transition the game to.

This recursive definition requires a base case, which in this case is given by both sets being empty, and we define this game to be “0”:

$$0 \equiv \mathcal{D}$$

From here three new Games can be constructed:

$$\begin{aligned} 1 &\equiv \mathcal{D}0 = \mathcal{D}\mathcal{D} \\ -1 &\equiv \mathcal{D}0 = \mathcal{D}\mathcal{D} \\ * &\equiv \mathcal{D}00 = \mathcal{D}\mathcal{D}\mathcal{D} \end{aligned}$$

1.1 Operations

The negation of a Game is equivalent to swapping players:

$$-G = \mathcal{D}--$$

The (disjoint) sum of two Games is defined by:

$$G + H = \mathcal{D}G + [H], +HG + [H], +H$$

and subtraction is defined as $G - H = G + (-H)$.

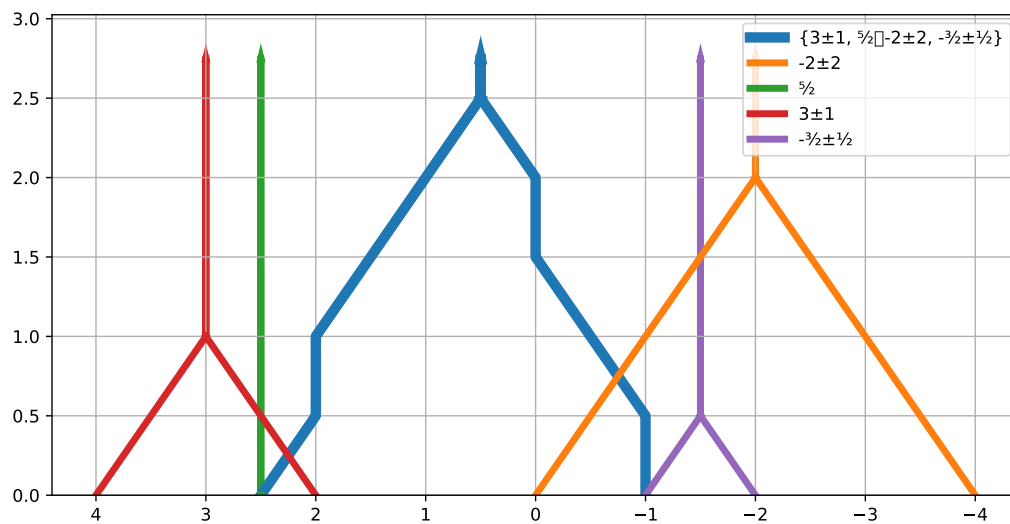
SURREAL NUMBERS

CHAPTER
THREE

NIMBERS

THERMOGRAPHY

Thermography is the study of a Game's *temperature*. Roughly, temperature is a measure of the impetus with which a player would like to move in the Game.



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