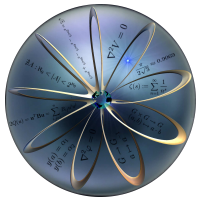

planetmath.org

Math for the people, by the people.

class structure

Canonical name	ClassStructure
Date of creation	2013-03-22 14:18:21
Last modified on	2013-03-22 14:18:21
Owner	CWoo (3771)
Last modified by	CWoo (3771)
Numerical id	12
Author	CWoo (3771)
Entry type	Definition
Classification	msc 60J10
Related topic	MarkovChain
Defines	communicating class
Defines	irreducible chain
Defines	closed class
Defines	absorbing state

Let $(X_n)_{n\geq 1}$ be a stationary Markov chain and let i and j be states in the indexing set. We say that i leads to j or j is accessible from i, and write $i \to j$, if it is possible for the chain to get from state i to state j:

$$i \to j \iff P(X_n = j : X_0 = i) > 0 \quad \text{for some} \quad n \geq 0$$

If $i \to j$ and $j \to i$ we say i communicates with j and write $i \leftrightarrow j$. $\leftrightarrow$ is an equivalence relation (easy to prove). The equivalence classes of this relation are the *communicating classes* of the chain. If there is just one class, we say the chain is an *irreducible chain*.

A class C is a *closed class* if $i \in C$ and $i \to j$ implies that $j \in C$ "Once the chain enters a closed class, it cannot leave it"

A state i is an *absorbing state* if $\{i\}$ is a closed class.