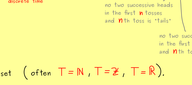
The Bright Side of Mathematics

Probability Theory – Part 23

Stochastic processes:
- "random variables in a row"
- random experiment with time evolution (discrete timesteps, continuous time)

board game: 

coin game: toss a coin again and again until two successive heads occur

$n \in \mathbb{N}$ (discrete time)

$$X_n : \{H, T\}^n \longrightarrow \{0,1,2\}$$

no two successive heads in the first n tosses and nth toss is "tails"

no two successive heads in the first n tosses and nth toss is "heads"

Two successive heads in the first n tosses

Definition: T set (often $T = \mathbb{N}$, $T = \mathbb{Z}$, $T = \mathbb{R}$).

For each $t \in T$, define: $X_t : \Omega \longrightarrow \mathbb{R}$ (random variable/ vector)

Then: $(X_t)_{t \in T}$ is called a stochastic process.

For $\omega \in \Omega$: the map $T \longrightarrow \mathbb{R}$, $t \mapsto X_t(\omega)$ is called path.

Example from before:

$$X_n : \{H, T\}^n \longrightarrow \{0,1,2\}$$