

Galtonova ploščča, centralni limitni izrek in difuzija

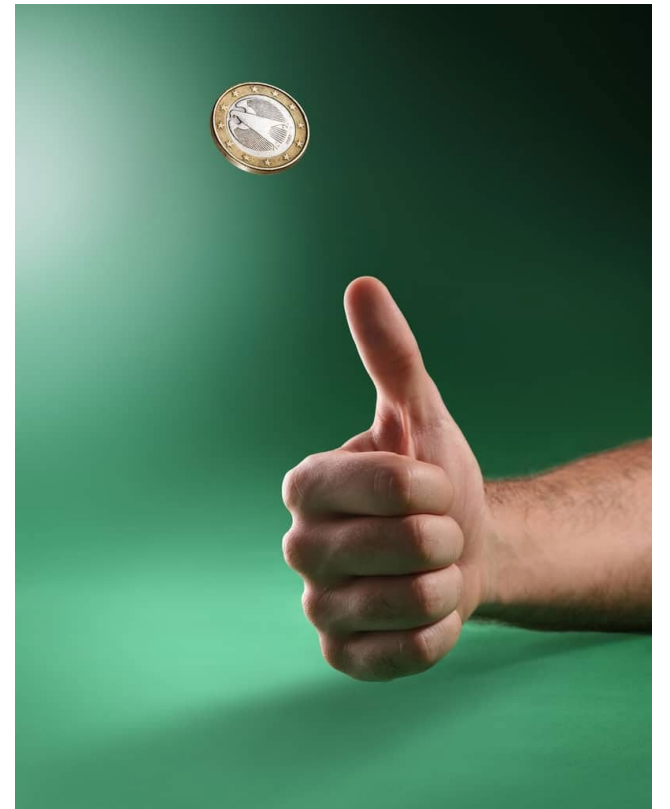
Aleš Mohorič

Presekov seminar za matematiko, fiziko in astronomijo

DMFA

2022-23

Galtonova plošča



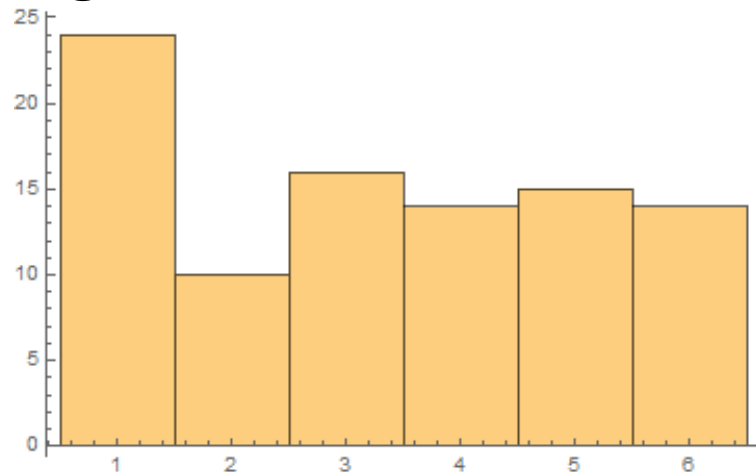


kako predstaviti rezultat meta kocke?

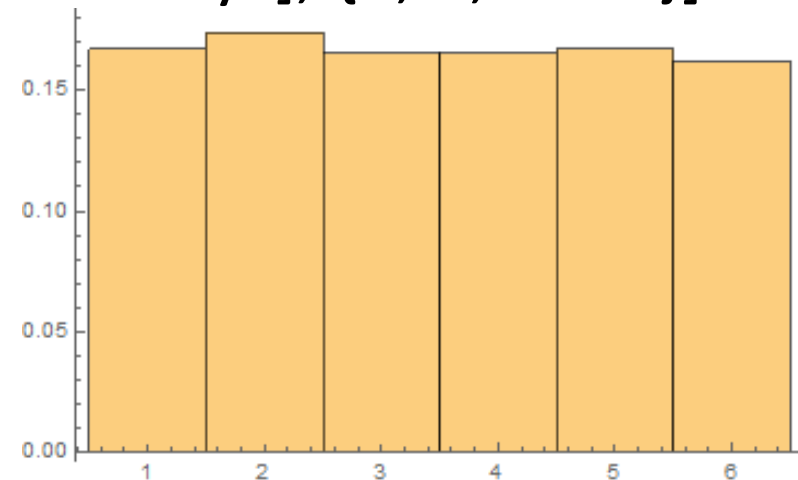
- niz
- {4, 2, 5, 4, 2, 4, 6, 2, 1, 1}
- histogram –

<https://www.wolframalpha.com/>

```
Animate[vrednosti = Table[RandomInteger[{1, 6}], n];  
Histogram[vrednosti, Automatic, "Probability"], {n, 6, 5000}]
```



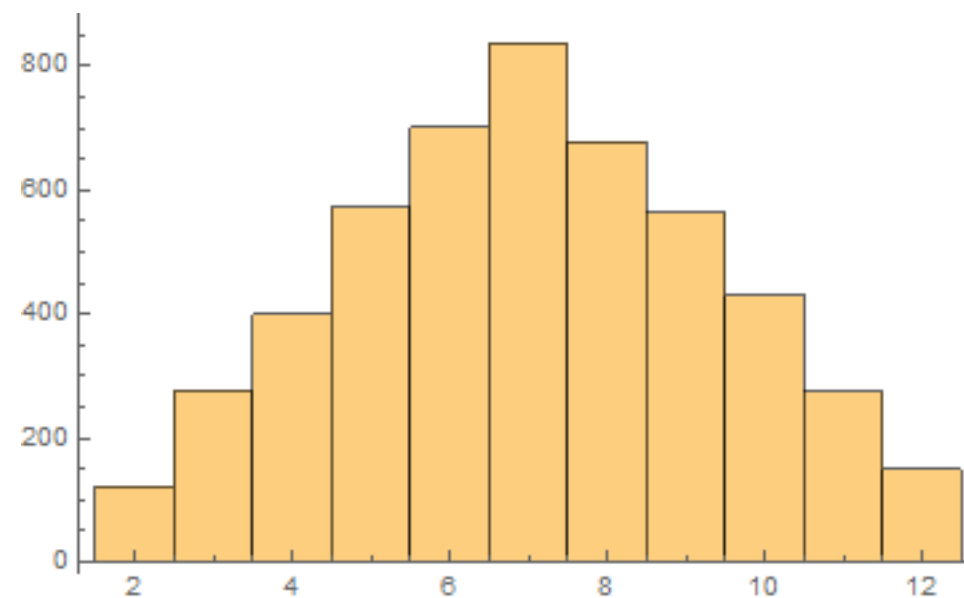
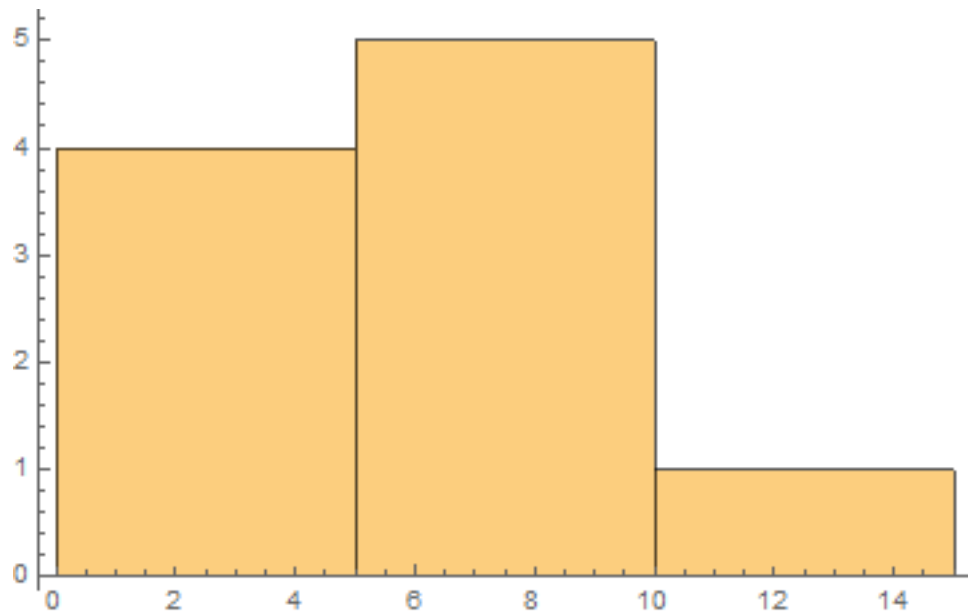
100 metov



4000 metov, normiran

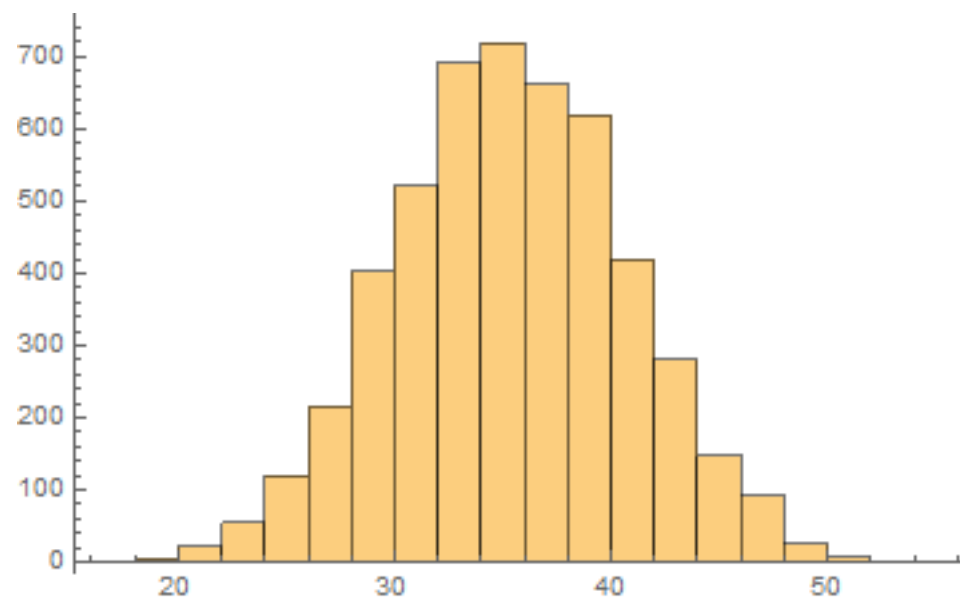
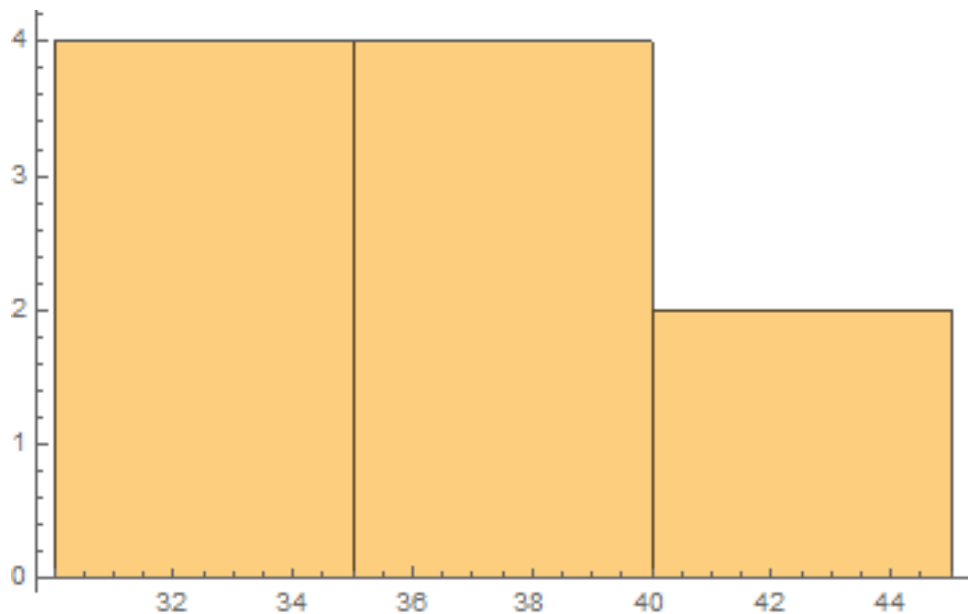
vsota metov več kock

- vsota dveh, deset metov; vsota dveh, 5000 metov



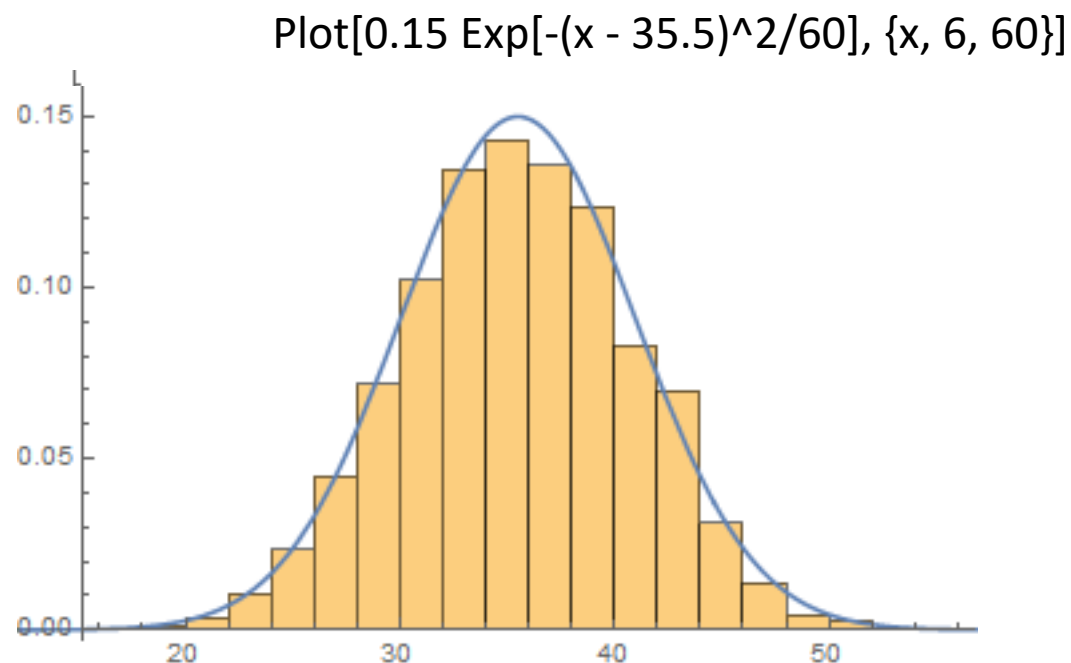
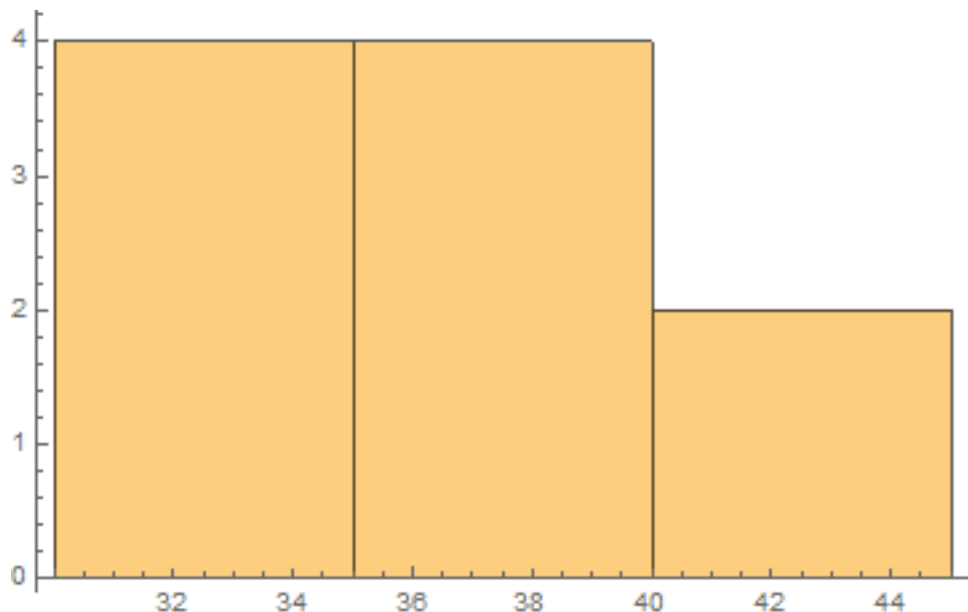
vsota metov več kock

- vsota desetih, deset metov; vsota desetih, 5000 metov
`Histogram[Table[Sum[RandomInteger[{1, 6}], {i, 10}], {k, 5000}]]`



vsota metov več kock

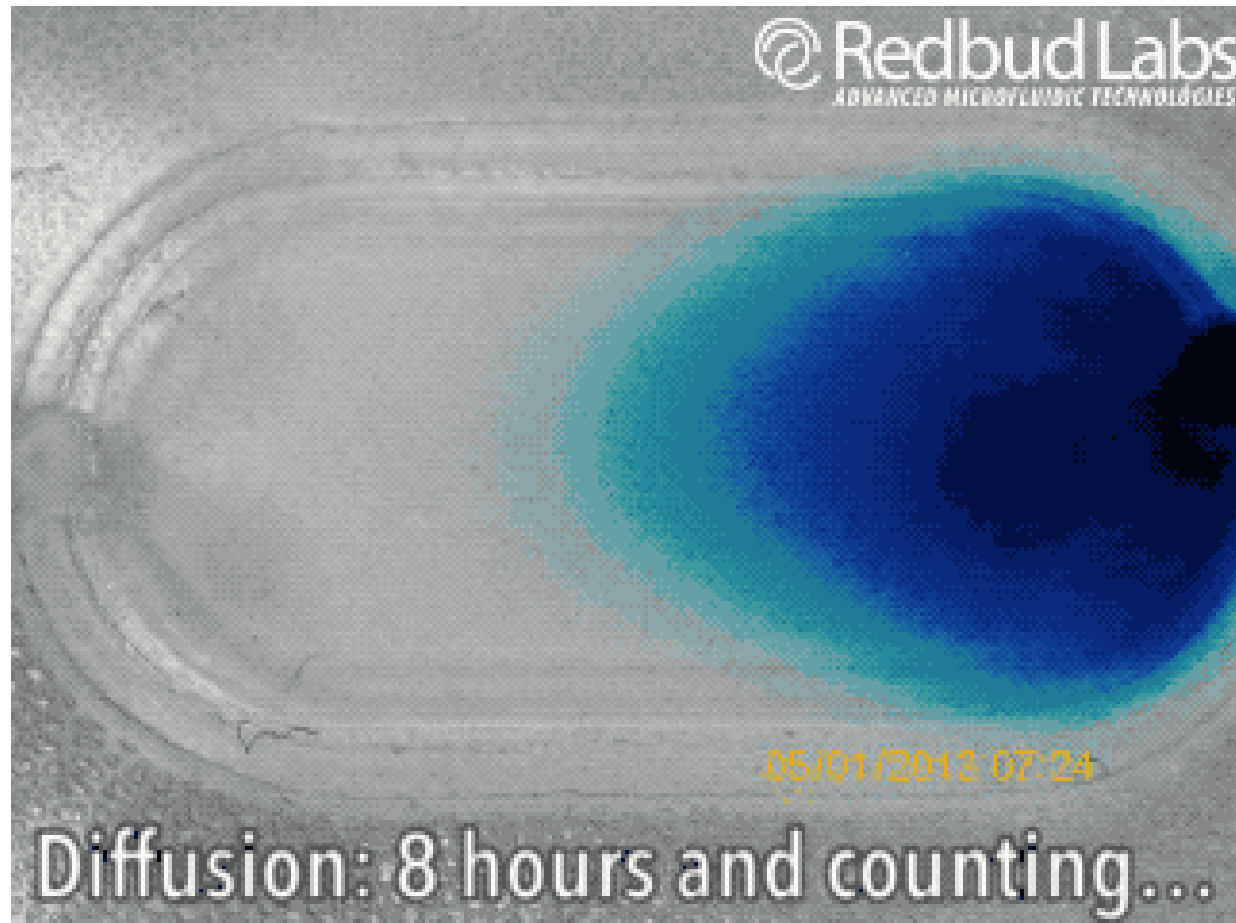
- vsota destih, deset metov; vsota desetih, 5000 metov
`Histogram[Table[Sum[RandomInteger[{1, 6}], {i, 10}], {k, 5000}]]`



centralni limitni izrek

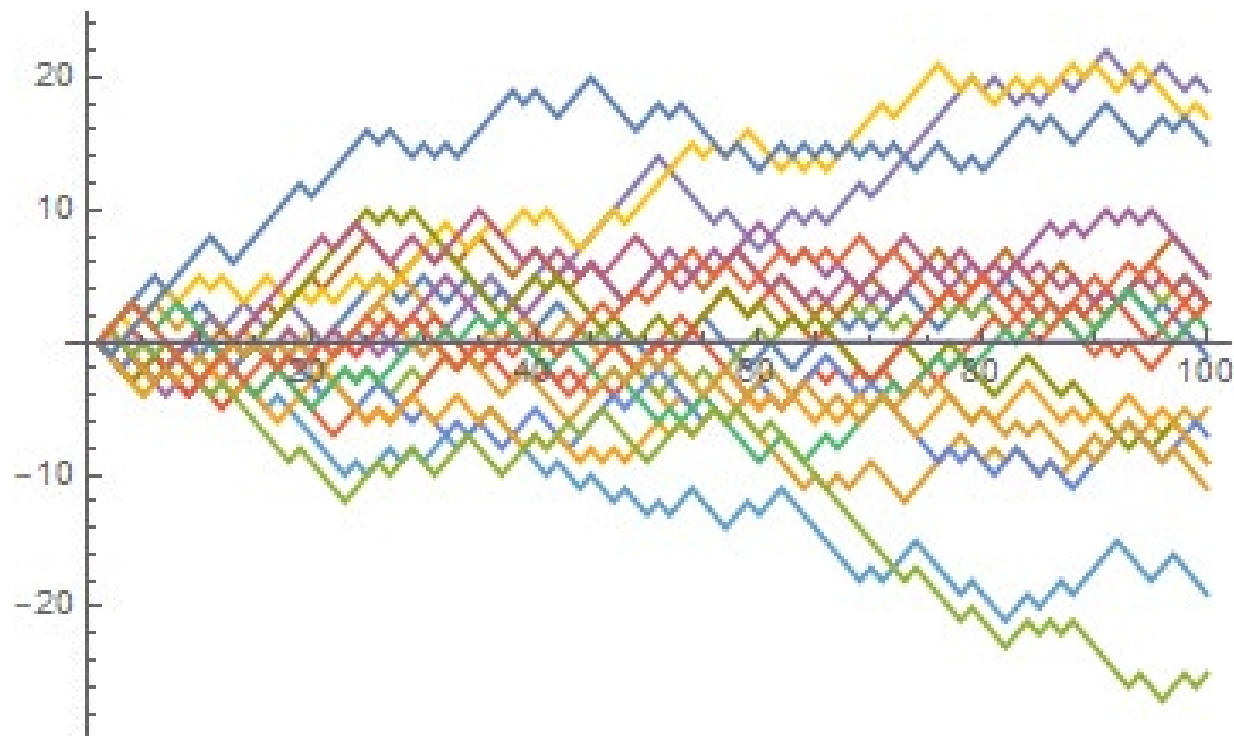
vsota (neodvisnih) vrednosti poljubno porazdeljene slučajne spremenljivke je približno normalno porazdeljena; čim več vrednosti seštejemo, tembolj se porazdelitev vsote približuje normalni (Gaussovi). To velja tudi za povprečje.

difuzija

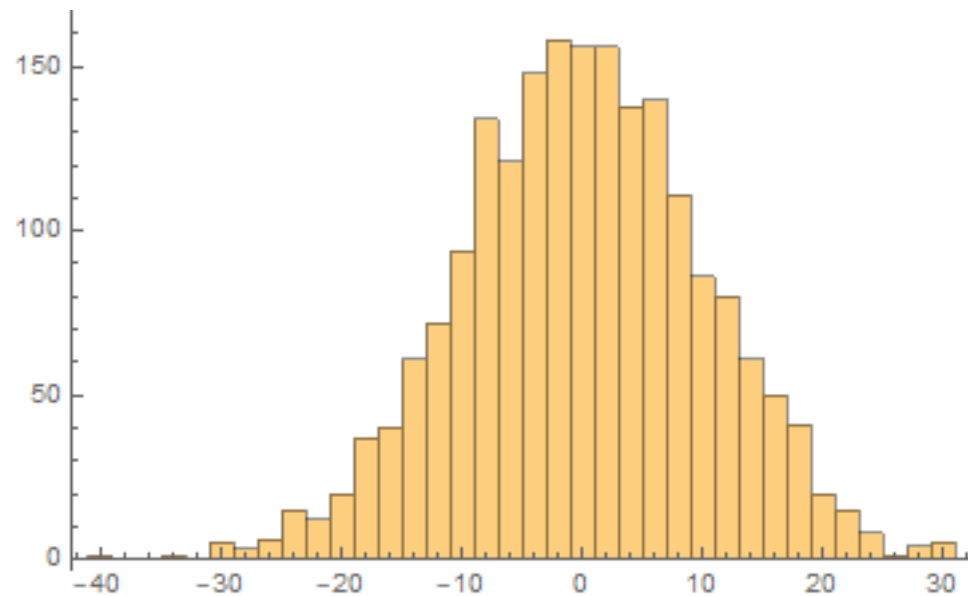


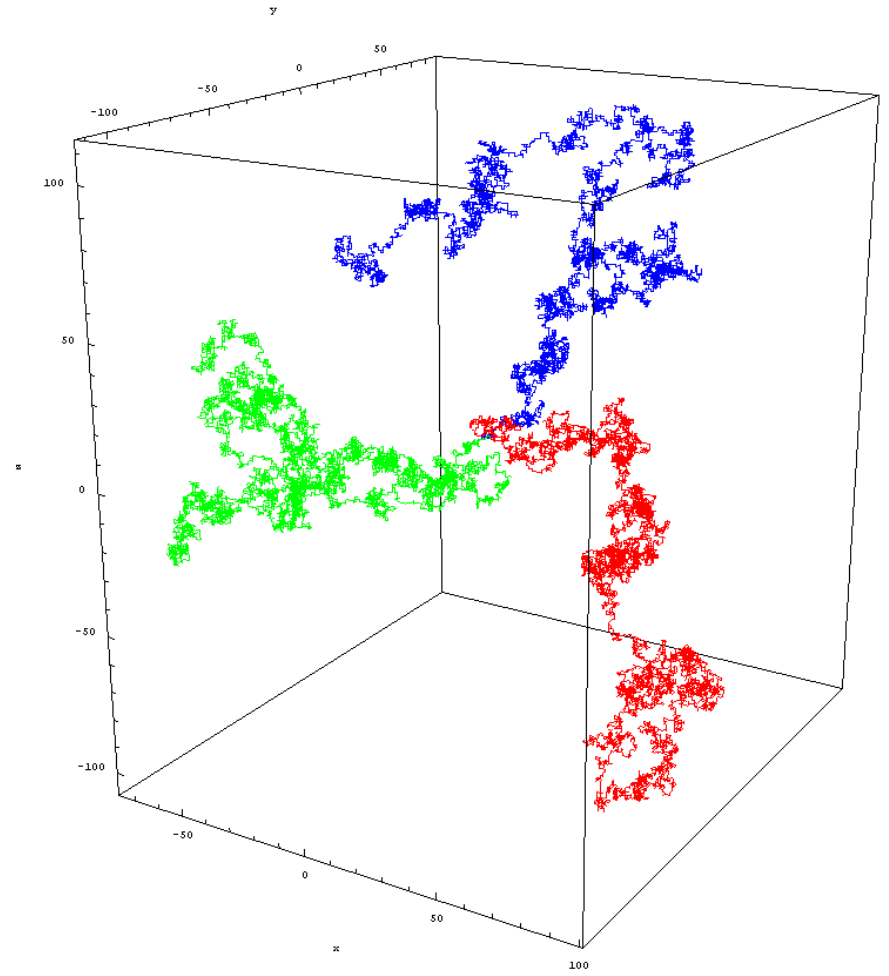
naključni hod

- `lega = Table[0, 100, 20];`
- `For[k = 1, k < 20, k++,`
 `For[`
 `i = 2, i < 101, i++,`
 `lega[[i]][[k]] = lega[[i - 1]][[k]] + (2 RandomInteger[{0, 1}] - 1)`
 `]]`
- `ListPlot[Transpose[lega], Joined -> True]`



- `Table[Sum[2 RandomInteger[{0, 1}] - 1, {i, 100}], {k, 2000}];`





Brownovo gibanje

