Testing the roulette wheel

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Abstract

The roulette wheel in principle generates random numbers uniformly distributed on the set $\{0, 1, 2, \ldots, 36\}$. Mechanical imperfections or wilful manipulation can lead to deviations from uniformity in various ways. Gambling houses are interested in statistics that would detect such deviations as soon as possible with the smallest probability of false alarms.

The talk will present some possible choices for statistics and find appropriate ways to control the size of test. Martingale methods will be used.

There are optimal ways to take advantage of a biassed roulette wheel. One can in turn use the optimal strategy for testing purposes. This again leads to martingales and martingale inequalities.