Stat 230: Probability

Casino Day

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Wednesday, June 2nd

Review

Example

We are poor college students so we decide to bet it all. Arriving at the local casino, what game should we play?

Review

For today:

(1) Casino Day!!

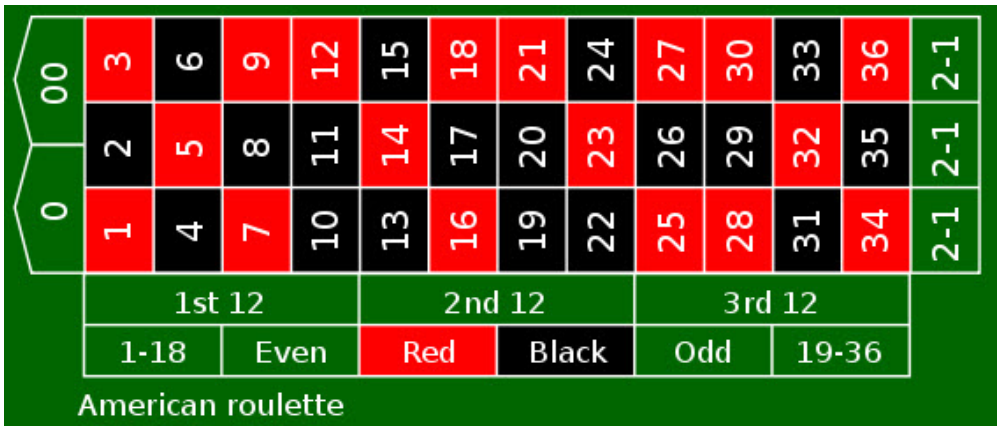
Roulette

American Roulette Wheel

- Numbers 1-36. Half are black, other half red
- Two green slots: 0 00

Roulette

Bet	Payout
Black/Red	1 to 1
Odd/Even	1 to 1
1st-3rd Dozen	2 to 1
Columns	2 to 1
Any number (including 0,00)	35 to 1



Roulette

Theorem

In roulette, all bets (except the Top-Line bet) have the same expected return on a \$1 bet of \$ -0.053.

Roulette

Double down strategy: Consider the following strategy to win \$1. In the game of roulette, bet \$1 on black. If you win, you have won \$1. If you lose, bet \$2. If you win on your second bet, you have won \$1. Otherwise, bet $\$2^2$ on next bet. Proceed in this way. If you win on the k^{th} bet you will have a return of $2^k - \sum_{i=0}^{k-1} 2^i = 1$ dollars.

Theorem

The probability that this betting system will result in you winning \$1 is one... so long as you have infinite money.

Craps

Craps:

- On the "come out" roll, the pass line bet wins 1:1 on a 7 or 11, and loses on 2,3, or 12.
- If the another number is rolled, the player wins 1:1 if that number is rolled again before a 7, and loses otherwise.

Craps

Example

Calculate the probability of "winning" on a pass line bet in craps

Example

Calculate the expected return on a \$1 pass line bet

Fun fact: Longest craps turn on record is 154 rolls in Atlantic city. The casino lost roughly \$2,000,000.

Craps

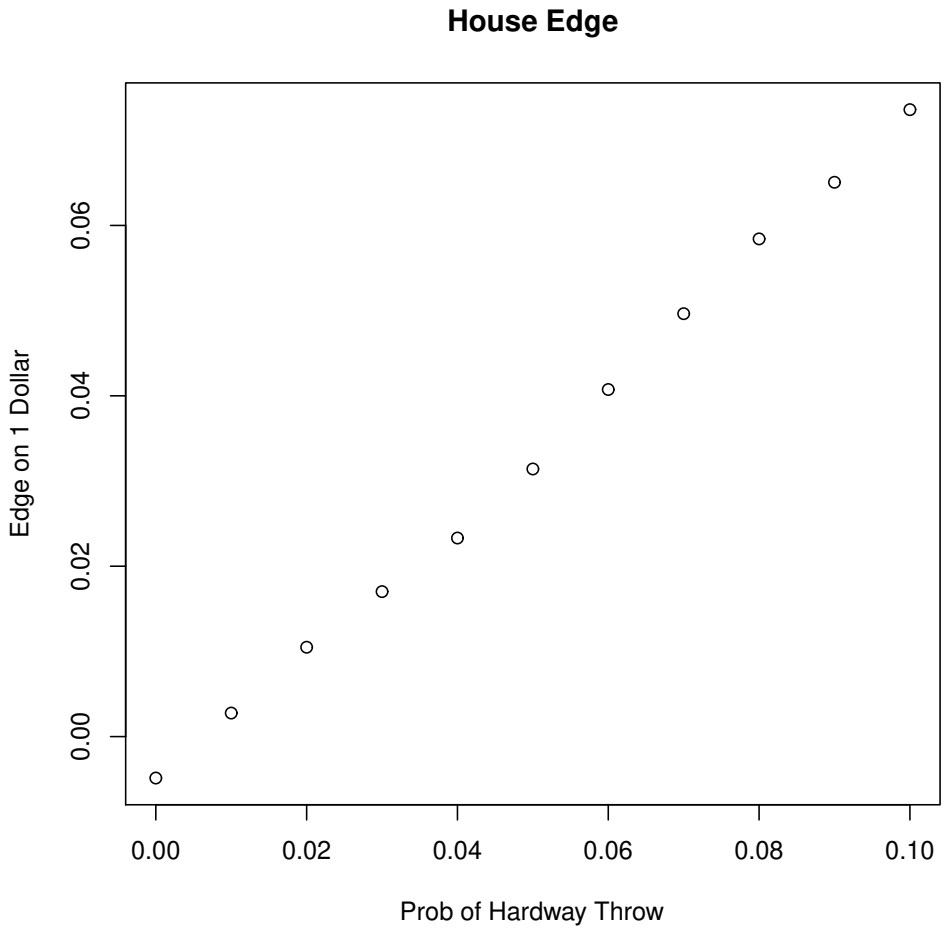
Example

The "odds bet" in craps is available after a point is set, and pays out so that the bet is fair. Calculate the payout of an odds bet if the point is 4.

Remark

The expected return on a \$1 craps bet split between the pass line and 3× odds is approximately -0.005

Craps


House Edge
Edge on 1 Dollar
0.00
0.02
0.04
0.06
0.00
0.02
0.04
0.06
0.08
0.10
Prob of Hardway Throw

Craps

Example

Calculate the expected return on a \$1 "hard way 4" bet (payout 7 to 1).