

CHAPTER 13 PROJECT

Probability



You may be familiar with the casino game of roulette. But have you ever tried to compute the probability of winning on a given bet?

The roulette wheel has 38 total slots. The wheel turns in one direction and a ball is rolled in the opposite direction around the wheel until it comes to rest in one of the 38 slots. The slots are numbered 00, and 0–36. Eighteen of the slots between 1 and 36 are colored black and eighteen are colored red. The 0 and 00 slots are colored green and are considered neither even nor odd, and neither red nor black. These slots are the key to the house's advantage.

The following are some common bets in roulette:

A gambler may bet that the ball will land on a particular number, or a red slot, or a black slot, or an odd number, or an even number (not including 0 or 00). He or she could wager instead that the ball will land on a column (one of 12 specific numbers between 1 and 36), or on a street (one of 3 specific numbers between 1 and 36).

The payoffs for winning bets are

- 1 to 1 on odd, even, red, and black
- 2 to 1 on a column
- 11 to 1 on a street
- 35 to 1 any one number

1. Compute the probability of the ball landing on
 - a. a red slot.
 - b. an odd number.
 - c. the number 0.
 - d. a street (any of 3 specific numbers).
 - e. the number 2.
2. Based on playing each of the scenarios above (a.–e.) compute the winnings for each bet individually, if \$5 is bet each time and all 5 scenarios lead to winnings.
3. If \$1 is bet on hitting just one number, what would be the expected payoff? (**Hint:** Expected payoff is $[(\text{probability of winning}) \cdot (\text{payment for a win})] - [(\text{probability of losing}) \cdot (\text{payout for a loss})]$.)
4. Given the information in question 3, would you like to play roulette on a regular basis? Why or why not? Why will the casino acquire more money in the long run?