Marginal and Joint Probabilities

- A voter can either be a Democrat or Republican (F) and has an age (A)
  - P(F = D) = .45
  - P(A < 30, F = D) = .2
  - P(A < 30, F = R) = .1
  - P(A > 50, F = D) = .1
  - P(30 ≤ A ≤ 50) = .3

Marginal and Joint Probabilities 2

- A voter can either be a Democrat or Republican (F) and has an age (A)
  - P(F = D) = .45
  - P(A < 30, F = D) = .2
  - P(A < 30, F = R) = .1
  - P(A > 50, F = D) = .1
  - P(30 ≤ A ≤ 50) = .3

- What if age and affiliation were independent? Calculate the joint probabilities using the marginal probabilities.

Expected Value 1

In Las Vegas the roulette wheel has a 0 and a 00 and then the numbers 1 to 36 marked on equal slots; the wheel is spun and a ball stops randomly in one slot. When a player bets 1 dollar on a number, he receives 36 dollars if the ball stops on this number, for a net gain of 35 dollars; otherwise, he loses his dollar bet. Find the expected value for his winnings.

Expected Value 2

In a second version of roulette in Las Vegas, a player bets on red or black. Half of the numbers from 1 to 36 are red, and half are black. If a player bets a dollar on black, and if the ball stops on a black number, she gets her dollar back plus another dollar. If the ball stops on a red number or on 0 or 00, she loses her dollar. Find the expected winnings for this bet.

Expected Value 3

A card is drawn at random from a deck consisting of cards numbered 1 through 10. A player wins 1 dollar if the number on the card is odd and loses 1 dollar if the number if even. What is the expected value of the winnings?

Probability Algebra

A 2012 Pew Research survey asked 2,373 randomly sampled registered voters their political affiliation (Republican, Democrat, or Independent) and whether or not they identify as swing voters. 35% of respondents identified as Independent, 23% identified as swing voters, and 11% identified as both.

- What percent of voters are Independent but not swing voters?

- What percent of voters are Independent or swing voters?

- What percent of voters are neither Independent nor swing voters?

Independence

A 2012 Pew Research survey asked 2,373 randomly sampled registered voters their political affiliation (Republican, Democrat, or Independent) and whether or not they identify as swing voters. 35% of respondents identified as Independent, 23% identified as swing voters, and 11% identified as both.

- Is the event that someone is a swing voter independent of the event that someone is a political Independent? Answer:
    1. mathematically
    2. descriptively