

1. PROBABILITY

- (1) What is the probability of drawing a blackjack (A and one of 10, J, Q, or K) when you pick two cards from a standard deck?
- (2) What is the probability of getting a straight when you pick a hand of five cards? (In this context, a straight counts with Ace low or Ace high, but not as the middle of a straight)

2. CONDITIONAL PROBABILITY

- (3) Rachel rolls two standard dice. What is the probability that she rolled at least one 6, given that she rolled two distinct numbers?
- (4) A string of 10 letters in the English alphabet is chosen uniformly at random. What is the probability that the string includes an A given that it includes exactly 3 vowels? (“y” is not considered a vowel.)

3. BAYES' THEOREM

- (5) In a given population, 10% of families have 1 child, 25% have two children, 35% have three children, and 30% have four children.
A family is selected at random from the population, and a child is chosen randomly from that family. If the child chosen is the oldest child, calculate the probability that the chosen family has k children, for $k = 1$ and 4.