Permutations and Combinations

CS/APMA 202

Epp section 6.4

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Permutations vs. Combinations

- Both are ways to count the possibilities
- The difference between them is whether order matters or not
- Consider a poker hand:
  - A♦, 5♥, 7♣, 10♠, K♠
- Is that the same hand as:
  - K♠, 10♠, 7♣, 5♥, A♦
- Does the order the cards are handed out matter?
  - If yes, then we are dealing with permutations
  - If no, then we are dealing with combinations

Permutations

- A permutation is an ordered arrangement of the elements of some set *S*
  - Let *S* = {a, b, c}
  - c, b, a is a permutation of S
  - b, c, a is a *different* permutation of S
- An *r*-permutation is an ordered arrangement of *r* elements of the set
  - A♦, 5♥, 7♣, 10♠, K♠ is a 5-permutation of the set of cards
- The notation for the number of *r*-permutations: $P(n,r)$
  - The poker hand is one of P(52,5) permutations