

ECE 341 - Homework #2

Combinatorics & Card Games. Summer 2023

Combinatorics in Bridge

The card game *bridge* uses a 52-card deck. Each person is dealt 13 cards for their hand.

- 1a) How many different hands are possible? (order doesn't matter)
- 1b) What is the probability of having 7 cards of one suit in your hand?

- 2) What is the probability of having two face-cards (Jacks, Queens, Kings, or Aces)?

- 3) Check your answer using Matlab and a Monte-Carlo simulation with
 - A 52-card deck
 - 13-card hands, and
 - 100,000 hands

In 6-card poker, you're dealt 6 cards

- 4) Compute the odds of 2-pair in 6-card poker using combinatorics.

note: your answer should match what you found using enumeration.

hand = xx yy ab

- 5) Compute the odds being dealt one-pair using combinatorics

again, your answer should match what you found using enumeration.

hand = xx a b c d

- 6) Determine the odds of a 2-pair and 1-pair using Matlab and a Monte-Carlo simulation and 100,000 hands of 6-card poker

Conditional Probability in 6-Card Poker

- 7) Compute the probability of getting 4-of-a-kind if there is a single draw step

- If you are dealt 4-of-a-kind, draw no cards hand = xxxx draw 0
- If you are dealt 3-of-a-kind, draw 3 cards hand = xxx abc discard abc, draw 3
- If you are dealt 2-pair or 2-of-a-kind, draw 4 cards hand = xx abcd discard abcd, draw 4
- If you are dealt no pairs, draw 5 cards. hand = abcdef discard abcde, draw 5

- 8) Check your answers using a Monte Carlo simulation with 100,000 hands of 6-card draw poker