Stat 19:Fiat Lux, Holdem or Foldem, Probability and Poker

Outline for the day:

1. Addiction

2. Syllabus, etc.

3. Wasicka/Gold/Binger example.

4. Meaning of probability.

5. Axioms of probability.

♠ ♣ ♥ ♦

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MO, WENJIE
NICOLAOU, GIORGIA
SAKAGUCHI, KELLI
SMITH, ROBERT

VAID, FILZA
WU, JACK.

For next class,

    (i) Learn the rules of Texas Hold'em.

      (https://www.cardplayer.com/rules-of-poker/how-to-play-poker/games/texas-holdem . There are tons of sites explaining this.)

    (ii) Read addiction handout and legality handout at course website http://www.stat.ucla.edu/~frederic/19/S20 .

Sometime in the next few weeks

    (iii) Download R and try it out.

      (http://cran.stat.ucla.edu)

Wasicka/Gold/Binger Example

Wasicka/Gold/Binger Example, Continued

Gold: 4♠ 3♣.   Binger: A♦ 10♦.   Wasicka: 8♠ 7♠.
Flop: 10♣ 6♠ 5♠.   (Turn: 7♣. River: Q♠.)

Wasicka folded?!? ♠ ♣ ♥ ♦

He had **8♠ 7♠** and the flop was **10♣ 6♠ 5♠**.
        Worst case scenario: suppose he were up against

9♠ 4♠ and **9♥ 9♦**. How could Wasicka win?
        88   (3:   8♣8♦, 8♣ 8♥, 8♦ 8♥)
        77   (3)
        44   (3)
[Let "X" = non-49, "Y" = A2378JQK, and "n" = non-♠]
        4n Xn   (3 x 32)
        9♣ 4n   (3)
        9♣ Yn   (24).   **Total: 132 out of 903 = 14.62%.**

Meaning of Probability.

Notation: "P(A) = 60%". A is an *event*.
Not "P(60%)".

Definition of probability:

Frequentist: If repeated independently under the same conditions millions and millions of times, A would happen 60% of the times.

Bayesian: Subjective feeling about how likely something seems.

P(A *or* B) means P(A or B <u>or both</u>)
Mutually exclusive: P(A and B) = 0.
Independent: P(A given B) [written "P(A|B)"] = P(A).
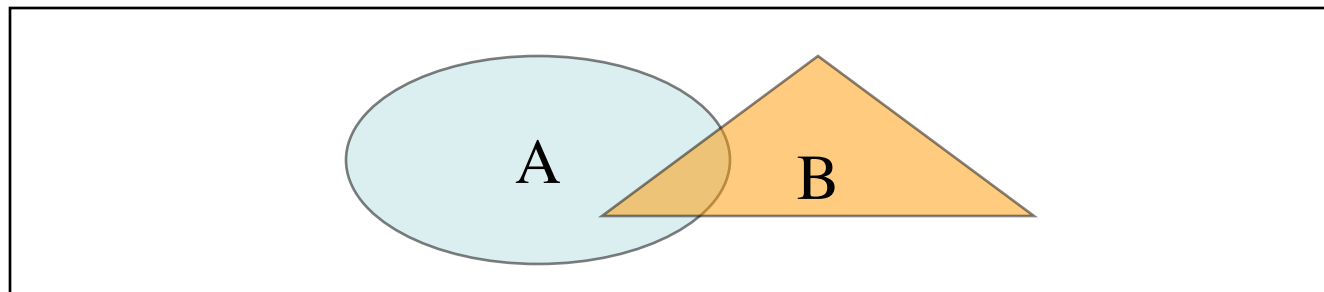$P(A^c)$ means P(not A).

2. Axioms (initial assumptions/rules) of probability:

1) $P(A) \geq 0$.
2) $P(A) + P(A^c) = 1$.
3) If $A_1, A_2, A_3, \ldots$ are mutually exclusive, then
   $P(A_1 \text{ or } A_2 \text{ or } A_3 \text{ or } \ldots) = P(A_1) + P(A_2) + P(A_3) + \ldots$

(#3 is sometimes called the *addition rule*)

Probability <=> Area.   Measure theory, Venn diagrams

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$.