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.

♠ ♣ ♥ ♦

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 at course website
http://www.stat.ucla.edu/~frederic/19/S24 .

(iii) Read about legality of poker at
https://www.pokernews.com/us-poker-map/california.htm

Sometime in the next few weeks

(iii) Download R and try it out.
(www.r-project.org)

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.

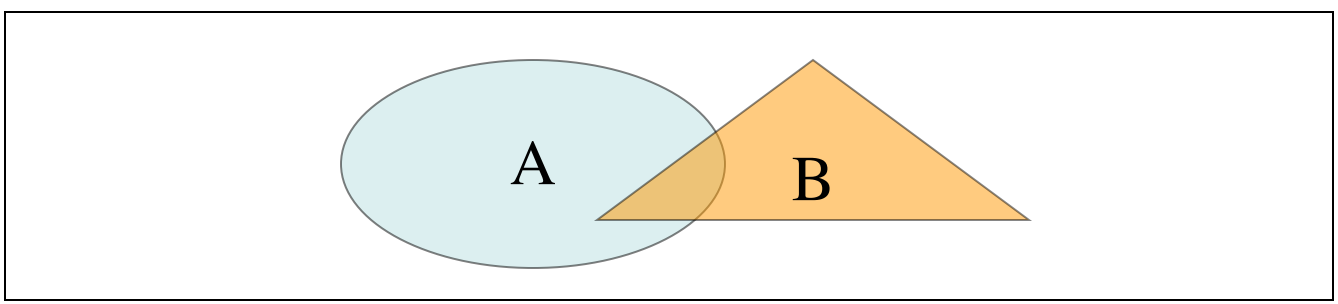
P(A *or* B) means P(A or B or both)
Mutually exclusive: P(A and B) = 0.
Independent: P(A given B) [written "P(A|B)"] = P(A).
$P(A^c)$ means P(not A).

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



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