Stat 19, Probability and Poker. Rick Paik Schoenberg

Outline for the day:

1. Discuss Harrington handouts.

2. Ly vs. Negreanu.

3. Addition rule.

4. P(A♠ after first ace).

Read harrington2.pdf for next time.

Think of at least 2 questions or comments, for each class.

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

Ly vs. Negreanu.

Ex. Suppose you have two ♣s, and there are exactly two ♣s on the flop. Given this info, what is P(at least one more ♣ on turn or river)?

Answer: 52-5 = 47 cards left (nine ♣s, 38 others).

So n = choose(47,2) = 1081 combinations for next 2 cards.

Each equally likely (and obviously mutually exclusive).

Two-♣ combos: choose(9,2) = 36. One-♣ combos: 9 x 38 = 342.
Total = 378. So answer is 378/1081 = 35.0%.

Answer #2: Use the addition rule…

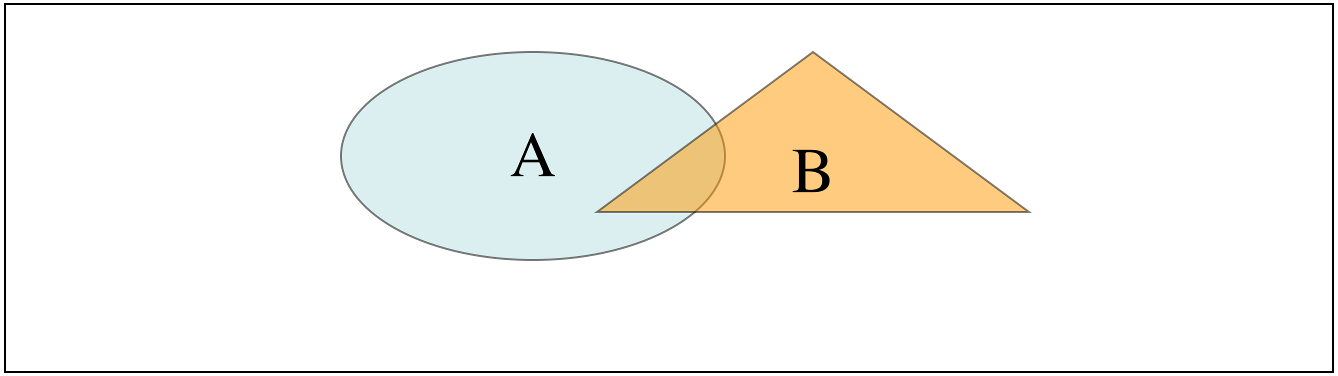
ADDITION RULE, revisited…..

Axioms (initial assumptions/rules) of probability:

1) $P(A) \geq 0$.
2) $P(A) + P(A^c) = 1$.
3) Addition rule:

   If $A_1, A_2, A_3, \ldots$ are mutually exclusive, then

   $P(A_1 \text{ or } A_2 \text{ or } A_3 \text{ or } \ldots) = P(A_1) + P(A_2) + P(A_3) + \ldots$



As a result, even if A and B might not be mutually exclusive,

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

Ex. You have two ♣s, and there are exactly two ♣s on the flop. Given this info, what is P(at least one more ♣ on turn or river)?

Answer #1: 52-5 = 47 cards left (nine ♣s, 38 others).

So n = choose(47,2) = 1081 combinations for next 2 cards.

Each equally likely (and obviously mutually exclusive).

Two- ♣ combos: choose(9,2) = 36. One-♣ combos: 9 x 38 = 342.

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Answer #2: Use the addition rule.

P(≥ 1 more ♣) = P(♣ on turn OR river)

= P(♣ on turn) + P(♣ on river) - P(both)

= 9/47 + 9/47 - choose(9,2)/choose(47,2)

= 19.15% + 19.15% - 3.3% = 35.0%.

4. Deal til first ace appears. Let X = the *next* card after the ace.

P(X = A♠)? P(X = 2♣)?

(a) How many permutations of the 52 cards are there?

52!

(b) How many of these perms. have A♠ right after the 1st ace?

(i) How many perms of the *other* 51 cards are there?

51!

(ii) For *each* of these, imagine putting the A♠ right after the 1st ace.

1:1 correspondence between permutations of the other 51 cards & permutations of 52 cards such that A♠ is right after 1st ace.

So, the answer to question (b) is 51!.

Answer to the overall question is 51! / 52! = 1/52.

Obviously, same goes for 2♣.