Simple Poker Hand Probability

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April 3, 2022

Abstract

Simple formulae for estimating the probability of chosen poker hands.

General

The probability of drawing a hand with D cards of S chosen suits and R chosen ranks, excluding E cards from the deck before drawing the remainder of an H-card hand, is estimated as follows:

$$P(S,R,D,E,H) = \frac{\binom{4}{S}\binom{13}{R}\binom{52-E}{H-D}}{\binom{52}{H}}$$

Note that this will include higher value hands, e.g. P_{OAK} below will not exclude chance of drawing FH, straight, etc.

N-of-a-kind (or better)

The probability of drawing an N-of-a-kind (or better) in an H-card hand is estimated by choosing N cards from 1 rank and N suits, excluding the 4 cards of the given rank from the rest of the hand:

$$P_{OAK}(N,H) = P(N,1,N,4,H)$$

Ex.: Probability of 4OAK on a 5-card hand is estimated by $P_{OAK}(4,5) \approx 0.024\%$. 3OAK on 5-card hand estimated as $\approx 2.25\%$ vs. $\approx 2.11\%$ excluding FH etc.

N-card flush (or better)

The probability of drawing an N-card flush (or better) in an H-card hand is estimated by choosing N cards from 1 suit and N ranks, excluding the 13 cards of that suit from the rest of the draw:

$$P_{FLUSH}(N,H) = P(1,N,N,13,H)$$

Ex.: Probability of a 3-card flush in a 7-card hand is estimated by $P_{FLUSH}(3,7) \approx 70\%$.