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Perfect Bridge Hand

Problem

We often read of someone who has been dealt 13 spades at bridge. With a well-shuffled pack of cards, what is the chance that you are dealt a perfect hand (13 of one suit)? (Bridge is played with an ordinary pack of 52 cards, 13 in each of 4 suits, and each of 4 players is dealt 13.)

Solution

For each of the 4 suits, there are $13!$ ways to draw only cards from that suit. The total number of possible hands a player can be dealt is ${}^{52}P_{13}$. Thus, the probability of being dealt a perfect hand is:

$$P(\textit{Perfect Hand}) = 4 \left(\frac{13!}{{}^{52}P_{13}} \right) \approx 6.299 \times 10^{13}$$