1 Lesson 3 Example 4

In Lesson 1, you calculated the probability of a "flush of hearts" in poker by counting the possible hands. There, you took order into account. Repeat the calculation by counting the possible hands where order does not matter.

2 Answer

1. Total Number of 5-Card Hands:
   The total number of ways to choose 5 cards from a deck of 52 is given by the combination:
   $$\binom{52}{5} = \frac{52!}{5!(52-5)!} = \frac{52!}{5! \cdot 47!}$$
2. Number of Ways to Get a Flush of Hearts:
   The number of ways to choose 5 hearts from the 13 hearts in the deck is given by:
   $$\binom{13}{5} = \frac{13!}{5!(13-5)!} = \frac{13!}{5! \cdot 8!}$$
3. Probability Calculation:
   The probability of being dealt a flush of hearts is the ratio of the number of ways to choose 5 hearts to the total number of 5-card hands:
   $$P(\text{flush of hearts}) = \frac{\binom{13}{5}}{\binom{52}{5}}$$
4. Simplifying the Combinations:
   First, calculate the combination values:
   $$\binom{13}{5} = \frac{13!}{5! \cdot 8!} = \frac{13 \times 12 \times 11 \times 10 \times 9}{5 \times 4 \times 3 \times 2 \times 1} = 1287$$
   $$\binom{52}{5} = \frac{52!}{5! \cdot 47!} = \frac{52 \times 51 \times 50 \times 49 \times 48}{5 \times 4 \times 3 \times 2 \times 1} = 2598960$$
5. Final Probability:
   Now, plug these values into the probability formula:
   $$P(\text{flush of hearts}) = \frac{1287}{2598960}$$
6. Calculating the Decimal Value:
   Simplify and calculate the decimal value:
   $$P(\text{flush of hearts}) = \frac{1287}{2598960} \approx 0.000495$$

Conclusion:

The probability of being dealt a flush of hearts in a standard poker game, when order does not matter, is approximately 0.000495 or 0.0495%.