Problem 7

Given 4 cards with 13 possible values, calculate the probability of 1 pair, 2 pairs, 3 of a kind, and 4 of a kind.

$$P(\text{1 pair}) = \frac{\binom{13}{1}\binom{4}{2}\binom{12}{2}\binom{4}{1}\binom{4}{1}}{\binom{52}{4}} = 0.3042 = \boxed{30.42\%}$$

$$P(\text{2 pair}) = \frac{\binom{13}{2}\binom{4}{2}\binom{4}{2}}{\binom{52}{4}} = 0.01037 = \boxed{1.037\%}$$

$$P(\text{3 of a kind}) = \frac{\binom{13}{1}\binom{4}{3}\binom{12}{1}\binom{4}{1}}{\binom{52}{4}} = 0.0092 = \boxed{0.92\%}$$

$$P(\text{4 of a kind}) = \frac{\binom{13}{1}\binom{4}{4}}{\binom{52}{4}} = \boxed{0.0048\%}$$