Problem 1. What is the probability that a die never comes up an even number when it is rolled six times?

Problem 2. What is the probability that a five card poker hand contains a flush, that is, five cards of the same suit?

Problem 3. What is the probability that a hand of 13 cards contains no pairs?

Problem 4. Which is more likely: rolling a total of 9 when two dice are rolled or rolling a total of 9 when three dice are rolled?

Problem 5. Find the probability of each outcome when a biased die is rolled, if rolling a 2 or rolling a 4 is three times as likely as rolling each of the other four numbers on the die, and it is equally likely to roll a 2 or a 4.

Problem 6. Let $E$ and $F$ be two events such that $p(E) = 0.7$ and $p(F) = 0.5$. Show that $p(E \cup F) \geq 0.7$ and $p(E \cap F) \geq 0.2$.

Problem 7. Let $E$ and $F$ be two events. Prove Bonferroni’s inequality: $p(E \cap F) \geq p(E) + p(F) - 1$.

Problem 8. What is the conditional probability that exactly four heads appear when a fair coin is flipped five times, given that the first flip came up heads?