Problem 1. Prof. Pollak is flying from LA to Paris with two plane changes, in New York and London. The probability to lose a piece of luggage is the same, \( p \), in LA, NY, and London. Having arrived in Paris, Prof. Pollak discovers that his suitcase is lost. Calculate the conditional probabilities that the suitcase was lost in LA, NY, and London, respectively.

Problem 2. To encourage Elmer’s promising tennis career, his father offers him a prize if he wins two tennis sets in a row in a three-set series to be played with his father and the club champion alternately: father-champion-father, or champion-father-champion, according to Elmer’s choice. The champion is a better player than Elmer’s father. Which series should Elmer choose? (Assume that the results of the three tennis sets are independent.)

Problem 3. The face EGH of the tetrahedron FEGH is painted in three colors: red, green, and blue. The face EFH is painted red. The face HFG is painted green. The face GFE is painted blue. Define the following events:

\[ A_r = \{ \text{a face picked at random has red on it} \} \]
\[ A_g = \{ \text{a face picked at random has green on it} \} \]
\[ A_b = \{ \text{a face picked at random has blue on it} \} \]

Are \( A_r, A_g, A_b \) pairwise independent? Are they independent?

Problem 4. A box contains two fair coins and one biased coin. For the biased coin, the probability that any flip will result in a head is \( 1/3 \). Al draws two coins from the box at random, flips each of them once, observes one head and one tail, and returns the coins to the box. Bo then draws one coin from the box at random and flips it. The result it a tail. Determine the probability that neither Al nor Bo removed the biased coin from the box.

Problem 5. Die A has five olive faces and one lavender face; die B has three faces of each of these colors. A fair coin is flipped once. If it falls heads, the game continues by throwing die A alone; if it falls tails, die B alone is used to continue the game. However awful their face colors may be, it is known that both dice are fair.

(a) Determine the probability that the \( n \)-th throw of the die results in olive.

(b) Determine the probability that both the \( n \)-th and \((n+1)\)-st throws of the die result in olive.

(c) If olive readings result from all the first \( n \) throws, determine the conditional probability of an olive outcome on the \((n+1)\)-st throw. Interpret your result for large values of \( n \).
**Problem 6.** Each $||$ represents one communication link. Link failures are independent, and each link has a probability of 0.5 of being out of service. Towns A and B can communicate as long as they are connected in the communication network by at least one path which contains only in-service links. Determine, in an efficient manner, the probability that A and B can communicate.

**Problem 7.** A hiker leaves the point O, choosing one of the roads OB, OC, OD, OE at random. At each subsequent crossroads he again chooses a road at random. What is the probability of the hiker arriving at the point A?