Independent Events (and other stuff) – Skill Builder

Remember the test for independent events: TWO EVENTS ARE INDEPENDENT WHENEVER \( P(B \mid A) = P(B) \)

1. Suppose that for events \( A \) and \( B \), \( P(A) = 0.4 \) and \( P(B) = 0.3 \), and \( P(A \text{ and } B) = 0.1 \)
   a) Are \( A \) and \( B \) mutually exclusive?
   
   b) Are \( A \) and \( B \) independent?
   
   c) Find \( P(A \text{ or } B) \)
   
   d) Find \( P(B^c) \)
   
   e) Find \( P(A \mid B) \)
   
   f) Find \( P(B \mid A) \)

2. Suppose that for events \( A \) and \( B \), \( P(A) = 0.8 \), \( P(B) = 0.4 \), and \( P(A \text{ and } B) = 0.25 \)
   a) Are \( A \) and \( B \) mutually exclusive?
   
   b) Are \( A \) and \( B \) independent?
   
   c) Find \( P(A \text{ or } B) \)
   
   d) Find \( P(B^c) \)
   
   e) Find \( P(A \mid B) \)
   
   f) Find \( P(B \mid A) \)

3. Suppose that events \( A \) and \( B \) are independent. Suppose also that \( P(A) = 0.7 \) and \( P(B) = 0.6 \). Find \( P(A \text{ and } B) \)

4. Determine if the two events \( (A \text{ and } B) \) described are mutually exclusive, independent, and/or complements. (It’s possible that the two events fall into more than one of the three categories or none of them.)

   Roll two (six-sided) dice. Let \( A \) be the event that the first die is a 3 and \( B \) be the event that the sum of the two dice is 8.