Your answers should be as concise as possible while also fully explaining your solution. A correct solution without any explanation will not be given any credit. Please make an effort to write legibly.

1. What is the probability that at least one of a pair of fair dice lands on 6, given that the sum of the dice is \( i, i = 2, 3, \ldots, 12 \).  

2. A couple has 3 children. What is the probability that all 3 are girls if the eldest of the three is a girl?  

3. An urn initially contains 11 white and 13 black balls. Each time a ball is selected, its color is noted and it is replaced in the urn along with 3 other balls of the same color. Compute the probability that  
   (a) the first 3 balls selected are black and the next 3 are white;  
   (b) of the first 4 balls selected, exactly 2 are black  

4. Fifty-five percent of the students at a certain college are females. Seven percent of the students in this college are majoring in computer science. Four percent of the students are women majoring in computer science. If a student is selected at random, find the conditional probability that  
   (a) the student is female given that the student is majoring in computer science;  
   (b) this student is majoring in computer science given that the student is a female.  

5. Independent flips of a coin that lands on heads with probability \( p \) are made. What is the probability that the first four outcomes are:  
   (a) \( H, H, H, H \)  
   (b) \( T, H, H, H \)  
   (c) What is the probability that the pattern \( T, H, H, H \) occurs before the pattern \( H, H, H, H \)?  

6. Show that if \( P(A) > 0 \), then  
   \[ P(AB|A) \geq P(AB|A \cup B) \]