Problem 1. Tom is playing a gamble game, in which a fair coin is flipped and player can bet on the result, i.e. head or tail. Suppose Tom always bets on head, and stop playing the games only when he win for the first time. Here are the question:
a) What is the probability model? Does the probability law meets the requirements you get in the homework?
b) What is the probability that Tom stops playing the game after having played 2 times?  
c) Tom gets frustrated only if he do not win after having played 2 times. What is the probability that he is frustrated.
d) Given Tom is not frustrated, what is the probability that Tom win on the first play?  
e) Tom’s friend suggests him to randomly bet on head or tail each time rather than always bet on head, will the model and results change if Tom follows the suggestion?

Problem 2. (Modified from problem 19. on Chapter 1. supplement problems) A magnetic tape storing information in binary form has been corrupted, so it can only be read with bit errors. The probability that you correctly detect a 0 or 1 is 0.9. Each digit is a 1 or a 0 with equal probability. Given that you read a 1, what is the probability that this is a correct reading?

Problem 3. Suppose the same setting of problem 2, but the information is stored on the tape using repetition code, e.g. the ’1’ is stored as 11 (two bits) on the tape and thus the ’10’ will be stored as 1100, a similar question is that: given that the first two bits you read is 10, what is the probability that the information stored is ’1’?