Probability lesson plan 2

Bayes theorem:

1. State and proof Bayes theorem.
2. A factory produces a certain type of outputs by three types of machine. The respective daily production figures are:
   Machine-I: 3,000 units; Machine-II: 2,500 units; Machine-III: 4,500 units.
   Past experience shows that 1% of the output produced by Machine-I is defective. The corresponding fractions of defective for the other two machines are 1.2% and 2% respectively. An item is drawn at random from the day's production run and is found to be defective. What is the probability that it comes from the output of (i) Machine-I, (ii) Machine-II, (iii) Machine-III?
3. The chances that doctor A will diagnose a disease X correctly is 60%. The chances that a patient will die by his treatment after correct diagnosis is 40% and the chances of death by wrong diagnosis is 70%. A patient of doctor A, who has disease X, died. What is the probability that his disease was diagnosed correctly?
4. In answering a question on a multiple choice test a student either knows the answer or he guesses. Let p be the probability that he knows the answer and 1-p the probability that he guesses. Assume that a student who guesses a answer will be correct with probability 1/5, where 5 is the number of multiple-choice alternatives. What is the conditional probability that a student knew the answer to a question given that he answered it correctly?
5. A vessel containing 3 white and 5 black balls, 4 balls are transferred into an empty vessel. From this vessel a ball is drawn and is found to be white. What is the probability that out of four balls transferred 3 white and 1 is black?