Probability (continued), Examples:

1- An Individual uses the following gambling system at Las Vegas. He bets $1 that the roulette wheel will come up red. If he wins, he quits. If he loses then he makes the same bet a second time only that this time he bets $2; and then regardless of outcome, quits. Assuming that he has a probability of 1/2 of winning each bet, what is the probability that he goes home a winner? Why is this system not used by everyone?

2- There are three coins in a box. One is a two-headed coin, another is a fair coin, and the third is a biased coin which comes up heads 75% of the time. When one of the three coins is selected at random and flipped, it shows heads. What is the probability that it was the two-headed coin?

3- Consider two boxes, one containing one black and one white marble, the other two black and one white marble. A box is selected at random, and a marble is drawn at random from the selected box.

  A. What is the probability that the marble is black?

  B. What is the probability that the first box was the one selected given that the marble is white?

4- A firm buys photodiodes from three suppliers as follows:

  20% from supplier A, the diodes of which are 1% defective;

  50% from supplier B, the diodes of which are 2% defective;

  30% from supplier C, the diodes of which are 4% defective.

  Parts from all three suppliers are mixed in the stock-room:

  A. Experiment No. 1:

  A part is selected at random from the stock-room. What is the probability that it is defective?

  B. Experiment No. 2:

  A part is selected at random and found to be defective. What is the probability that it came from supplier A?

5- Given a device with 4 components C_1-C_4, let $P(C_i)$, $i = 1, 2, 3, 4$, be the probability that ith component is defective, where $P(C_i)$, $i = 1, 2, 3,\ = 0.01$, $P(C_4) = 0.05$. The device is defective if more than one component is defective. Let $P(D)$ be probability that device is defective. Find $P(D)$, $P(D|C_1)$, $P(C_1|D)$, and $P(D|C_4)$.