1) This term 100 students take STAT319. 36 of these students play tennis, 28 play squash, and 18 play badminton. Furthermore, 22 of the members play both tennis and squash, 12 play both tennis and badminton, 9 play both squash and badminton, and 4 play all three sports. What is the probability that a student plays at least one of these sports?

2) The following information is known regarding three events A, B and C.

$P(A \cup B)=0.75$ $P(A \cap B)=0.50$ $P(B|C)=0.5$

$P(B \cup C)=0.75$ $P(A \cap C)=0.25$ $P(A|B)=0.75$

   a) Find the following probabilities P(A), P(B), P(C), P(B|A), $P(B \cap C)$, $P(A^c \cup B^c)$, $P(B^c|A)$, where A^c means the complement of A.
   b) Are the events B and C mutually exclusive?
   c) Are the events B and C independent?

3) A simple binary communication channel carries messages by using only two signals, say 0 and 1. We assume that, for a given binary channel, 40% of the time a 1 is transmitted; the probability that a transmitted 0 is correctly received is 0.90, and the probability that a transmitted 1 is correctly received is 0.95.
   a) Determine the probability of a 1 being received.
   b) Given that a 1 is received, what is the probability that 1 was transmitted.

4) The probability that an electronic grading machine will make an error on any particular question of a multiple choice exam is 0.01. If there are 20 questions, and questions are graded independently.
   a) What is the probability that at least one error is made on a given exam paper?
   b) What is the probability that the first error occurs on the fifth question?

5) A well known problem in traffic engineering is that of the "dilemma zone" associated with drivers who see the traffic signal change from green to orange as they are approaching the intersection. For drivers who are within 400 feet of the stop bar at the intersection at the onset of orange, it was found that 45% of drivers decelerate, 30% of drivers accelerate, and the remaining 25% maintain constant speed. Of those who decelerate, 95% eventually come to a complete stop. For those who choose to accelerate, none come to a complete stop, while 30% of those who initially maintain constant speed ultimately come to a stop.
   a) What is the probability that the next approaching driver at the onset of orange, will decelerate and continue through the intersection without stopping?

b) What is the probability that the next approaching driver at the onset of orange will continue through the intersection without stopping?
c) Given that the last approaching driver came to a complete stop after the onset of orange, what is the probability that he decelerated?