Department of Mathematics, Bennett University
EMAT203L (Probability and Statistics)
Tutorial sheet sheet 1

1. Two dice are rolled together, what is the probability that the sum of numbers occurred in two dices is 4?

2. An urn contains 4 tickets numbered 1, 2, 3, 4; and another urn contains 6 tickets numbered 2, 4, 6, 7, 8, 9. If one of the two urns is chosen at random and a ticket is drawn at random from the chosen urn,find the probabilities that the ticket drawn bears the number
   (a) 2 or 4 (b) 3 (c) 1 or 9

3. Jim and Bill like to shoot at targets. Jim can hit a target with a probability of 0.8, while Bill can hit a target with a probability of 0.7. If both fire at a target at the same time, what is the probability that the target is hit at least once?

4. Let A and B are independent events. Prove that following pairs of events are also independent.
   (a) A and B^c (b) A^c and B (c) A^c and B^c

5. Let A and B are independent events defined on some probability space, and let $P(A) = \frac{1}{3}$ and $P(B) = \frac{3}{4}$. Find
   (a) $P(A \cup B)$ (b) $P(A/A \cup B)$ (c) $P(B/A \cup B)$

6. In a region, 60% of the registered voters are Republicans; 30% are Democrats; and 10% are Independents. When these voters were asked about increasing military spending; 40% of Republicans opposed it, 65% of the Democrats opposed it; and 55% of the Independents opposed it.
   What is the probability that a randomly selected voter in this region opposes increased military spending?

7. A student buys 1000 integrated circuits (ICs) from supplier A, 2000 ICs from supplier B, and 3000 ICs from supplier C. He tested the ICs and found that the conditional probability of an ICs being defective depends on the supplier from whom it was bought. Specifically, given that an IC came from supplier A, the probability that it is defective is 0.05; given that an IC came from supplier B, the probability that it is defective is 0.10; and given that an IC came from supplier C, the probability that it is defective is 0.10.
   (a) If the ICs from the three suppliers are mixed together and one is selected at random, what is the probability that it is defective?
   (b) Given that a randomly selected IC is defective, what is the probability that it came from Supplier A?

8. An aircraft maintenance company bought equipment for detecting structural defects in aircraft. Tests indicate that 95% of the time the equipment detects defects when they actually exist, and 1% of the time it gives a false alarm that indicates the presence of a structural defect when in fact there is none.
   If 2% of the aircrafts actually have structural defects, what is the probability that an aircraft has a structural defect given that the equipment indicates that it has a structural defect.

9. Four roads lead away from a jail. A prisoner has escaped from the jail and selects a road at random. If road 1 is selected, the probability of escaping is $\frac{1}{8}$; if road 2 is selected, the probability of escaping is $\frac{1}{6}$; if road 3 is selected, the probability of escaping is $\frac{1}{4}$; and if road 4 is selected, the probability of escaping is $\frac{9}{10}$.
   (a) What is the probability that the prisoner will succeed in escaping?
   (b) If the prisoner succeeds, what is the probability that the prisoner escaped by using road 4?