NANYANG TECHNOLOGICAL UNIVERSITY
School of Electrical & Electronic Engineering

EE4491 Probability Theory & Applications

Tutorial No. 2 (Sem 1, AY2021-2022)

1. A manufacturer of electronic equipment purchases 1000 ICs from supplier *A*, 2000 ICs from supplier *B*, and 3000 ICs from supplier *C*. Testing reveals that the conditional probability of an IC failing during burn-in from each of the suppliers is

$$\Pr(F|A) = 0.1, \qquad \Pr(F|B) = 0.05, \qquad \Pr(F|C) = 0.08$$

The ICs from all suppliers are mixed together and one device is selected at random.
(a) What is the probability that it will fail during burn-in?
(b) Given that the device fails, what is the probability that the device came from supplier *A*?

2. A communication network has five links as shown in Figure 1.

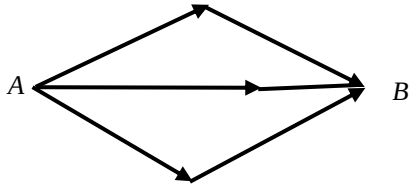

Figure 1

The probability that each link is working is 0.9. What is the probability of being able to transmit a message from point *A* to point *B*.

3. In a digital communication system, messages are encoded into the binary symbols, binary 0 and binary 1. Because of noise in the system, the incorrect symbol is sometimes received. Suppose that the probability of a binary 0 being transmitted is 0.4 and the probability of a binary 1 begin transmitted is 0.6. Further suppose that the probability of transmitted binary 0 being received as a binary 1 is 0.08 and the probability of a transmitted binary 1 being received as a binary 0 is 0.05.
(a) Find the probability that a received binary 0 was transmitted from a binary 0.
(b) Computer the probability that a received binary 1 was transmitted from a binary 1.
(c) Determine the probability that any symbol is received in error.

Answer
(1) (a) 0.0733; (b) 0.0227
(2) 0.99639
(3) (a) 0.9246; (b) 0.9468; (c) 0.062