*Assignment 1*
*Chapter 1 & 2*
*SCST 310*

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## Question 1:

**An aircraft emergency locator transmitter (LT) is a device designed to transmit a signal in the case of a crash. The (A) Company makes 65% of the LTs, the (B) Company produces 30% of them, and the (C) Company makes the other 5%.**

**The LTs made by A, B, and C companies have defective rates of 5%, 3%, and 8% respectively.**

**(a) If the (LTs) from the three companies are mixed and one is selected at random, what is the probability that it was defective?**

**(b) If a randomly selected LT is defective, find the probability that the A Company made it?**

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## Question 2:

**The CDF of the discrete random variable X is given by:**

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| $F(x)$ | 0.05 | 0.1 | 0.35 | 0.5 | 0.65 | 1 |

**Compute:**

(a) $P[X = 2]$

(b) $P[X > 2]$

1) a. $P[D] = P[D \cap A] + P[D \cap B] + P[D \cap C]$

$P[D] = P[D|A] \times P[A] + P[D|B] \times P[B] + P[D|C] \times P[C]$

$= 0.05 \times 0.65 + 0.03 \times 0.30 + 0.08 \times 0.05$

$P[D] = 0.0455$

b. $P[A|D] = \frac{P[A \cap D]}{P[D]} = \frac{P[D|A] \times P[A]}{0.0455}$

$= \frac{0.05 \times 0.65}{0.0455} = 0.71$

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2)

| | $X=0$ | $X=1$ | $X=2$ | $X=3$ | $X=4$ | $X=5$ |
|---|---|---|---|---|---|---|
| PMF | $\frac{1}{20}$ | $\frac{1}{20}$ | $\frac{5}{20}$ | $\frac{3}{20}$ | $\frac{3}{20}$ | $\frac{7}{20}$ |

a. $P[X=2] = F_X[2] - F_X[1]$

$= 0.35 - 0.1 = \frac{5}{20}$

b. $P[X>2] = P[X=3] + P[X=4] + P[X=5]$

$= \frac{3}{20} + \frac{3}{20} + \frac{7}{20} = \frac{13}{20}$

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