

# Cankaya University

## ECE307 - Homework-2

October 10th-14th, 2011

A factory uses three machines A, B and C to produce certain items. Suppose,

Machine A produces 50% of the items of which 4% are defective.

Machine B produces 30% of the items of which 5% are defective.

Machine C produces 20% of the items of which 10% are defective.

1. Find the probability that a randomly selected item is defective.
2. Suppose a defective item is found among the output. Find the probability that it came from each of the machines.

Solution:

$$1. P(A) = 0.5, P(B) = 0.3, P(C) = 0.2;$$
$$P(D|A) = 0.04, P(D|B) = 0.05, P(D|C) = 0.10.$$

$$\text{Hence, } P(D) = P(D|A)P(A) + P(D|B)P(B) + P(D|C)P(C) = 0.055.$$

$$2. P(A|D) = \frac{P(A \cap D)}{P(D)} = \frac{P(D|A)P(A)}{P(D)} = 0.\overline{36}.$$
$$P(B|D) = \frac{P(B \cap D)}{P(D)} = \frac{P(D|B)P(B)}{P(D)} = 0.\overline{27}.$$
$$P(C|D) = \frac{P(C \cap D)}{P(D)} = \frac{P(D|C)P(C)}{P(D)} = 0.\overline{36}.$$