

# MAS291 - HOMEWORK

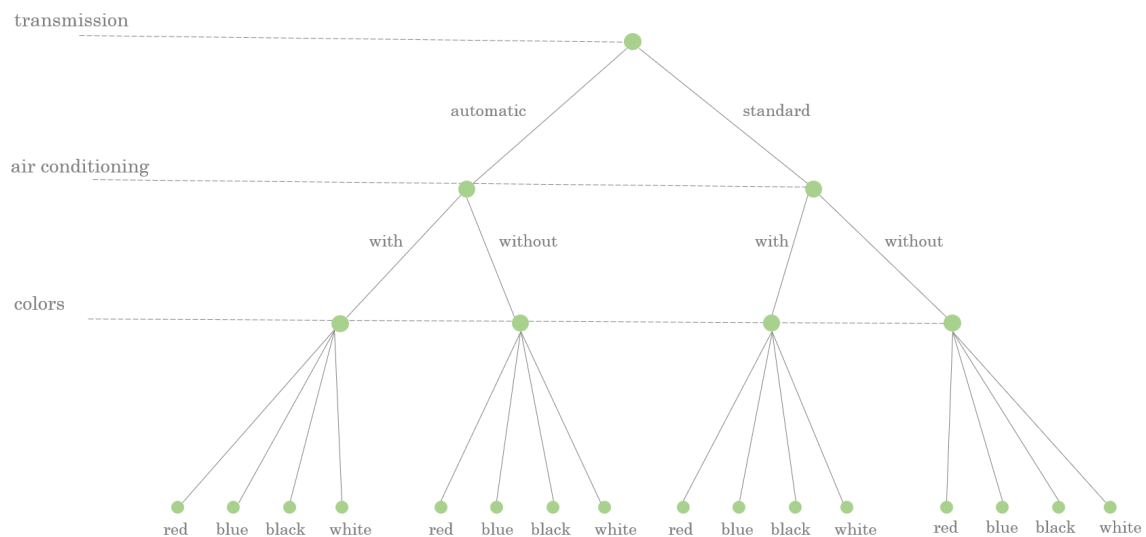
Nguyen Dang Loc - SE160199

## 2-14

An order for an automobile can specify either an automatic or a standard transmission, either with or without air conditioning, and with any one of the four colors red, blue, black, or white.

Describe the set of possible orders for this experiment.

**Solve:**



A - automatic transmission

S - standard transmission

W - with air conditioning

O - without air conditioning

R - red

B - blue

X - black

F - white

Possible orders:

$$S = \{AWR, AWB, AWX, AWF, AOR, AOB, AOX, AOF, \\ SWR, SWB, SWX, SWF, SOR, SOB, SOX, SOF\}$$

## 2-80

Suppose that a patient is selected randomly from the those described in Exercise 2-57.

	Complete Response	Total
Ribavirin plus interferon alfa	16	21
Interferon alfa	6	19
Untreated controls	0	20

Let  $A$  denote the event that the patient is in the group treated with interferon alfa, and let  $B$  denote the event that the patient has a complete response. Determine the following probabilities.

$$a)P(A) \quad b)P(B) \quad c)P(A \cap B) \quad d)P(A \cup B) \quad e)P(A' \cup B)$$

**Solve:**

$$|S| = 60$$

$$a) P(A) = 19/60 \approx 0.317$$

$$b) P(B) = 22/60 \approx 0.367$$

c)

$A \cap B$ : Patient who is treated with interferon alfa and has a complete response

$$P(A \cap B) = 6/60 = 0.1$$

d)

$A \cup B$ : Patient who is treated with interferon alfa or has a complete response

$$\begin{aligned} P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\ &= 19/60 + 22/60 - 6/60 \approx 0.583 \end{aligned}$$

e)

$A' \cup B$ : Patient who isn't treated with interferon alfa or has a complete response

$A' \cap B$ : Patient who isn't treated with interferon alfa and has a complete response

According to the table:  $|A' \cap B| = 16$

$$P(A' \cap B) = 16/60$$

$$\begin{aligned} P(A' \cup B) &= P(A') + P(B) - P(A' \cap B) \\ &= 1 - P(A) + P(B) - P(A' \cap B) \\ &= (1 - 19/60) + 22/60 - 16/60 \\ &\approx 0.783 \end{aligned}$$

## 2-112

Suppose A and B are mutually exclusive events. Construct a Venn diagram that contains the three events A, B and C such that  $P(A | C) = 1$  and  $P(B | C) = 0$ .

**Solve:**

$$P(A|C) = P(A \cap C)/P(C) = 1$$

$$\Rightarrow P(A \cap C) = P(C)$$

$$\Rightarrow A \cap C = C$$

$$P(B|C) = P(B \cap C)/P(C) = 0$$

$$\Rightarrow B \cap C = \emptyset$$

