

## Solutions Manual

### Chapter 2

#### Solutions – Chapter 2

1.

$E = \{x \mid x \text{ is a state of the US located east of the mississippi River}\}$

$W = \{x \mid x \text{ is a state of the US located west of the mississippi River}\}$

$C = \{x \mid x \text{ is a state of the US with a name that starts with a consonant}\}$

$V = \{x \mid x \text{ is a state of the US with a name that starts with a vowel}\}$

2. For  $E$  and  $W$ .

$M = \{x \mid x \in E \text{ and contains mountains}\}$

$N = \{x \mid x \in W \text{ and contains mountains}\}$

$D = \{x \mid x \in E \text{ and contains desert land}\}$

$C = \{x \mid x \in W \text{ and contains desert land}\}$

For  $C$  and  $V$ .

$O = \{x \mid x \in C \text{ and is bordered by an ocean or sea}\}$

$P = \{x \mid x \in V \text{ and is bordered by an ocean or sea}\}$

$F = \{x \mid x \in C \text{ and has a female governor}\}$

$G = \{x \mid x \in V \text{ and has a female governor}\}$

4.

a.  $E^c \cap F \cap G^c$

b.  $(E^c \cap F \cap G) \cup (E \cap F^c \cap G) \cup (E \cap F \cap G^c)$

c.  $E \cup F \cup G$

d.  $E \cap F^c \cap G$

e.  $E^c \cap F^c \cap G^c$

5.

a.  $A \cap B = \{(1,3), (3,1), (3,3), (3,5), (5,3)\}$

b.  $B' \cap C = \{(1,6), (2,5), (5,2), (6,1)\}$

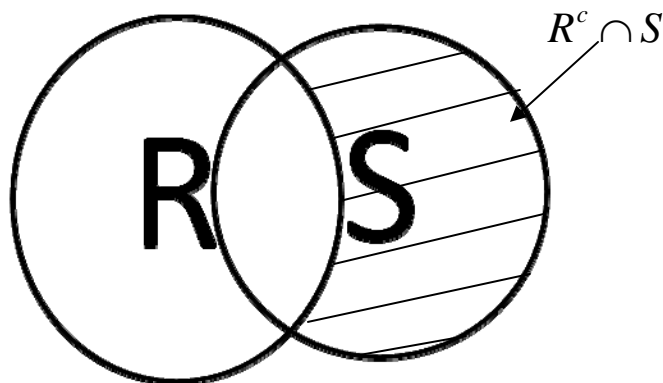
c.  $A \cap C = \emptyset$

d.  $A' \cap B' \cap C' = \{(1,2), (1,4), (2,1), (4,1), (4,5), (5,4), (5,6), (6,5)\}$

6.  $C \cap (A \cap B)^c = C \cap (A^c \cup B^c) = (C \cap A^c) \cup (C \cap B^c)$

7.  $R \cup (R^c \cap S) = (R \cup R^c) \cap (R \cup S) = \Omega \cap (R \cup S) = R \cup S$

8.



9.

a.  $A \cap C^c = \{(1,1), (1,2), (1,3), (2,1), (2,2), (3,1)\}$

b.  $A \cap B^c \cap C = \{(1,4), (1,5), (2,4), (4,1), (4,2), (5,1)\}$

c.  $B \cap C^c = \{(3,1), (1,3)\}$

d.  $A^c \cap C^c = \emptyset$

e.  $A \cup (B \cap C) = \{(1,1), (1,2), (1,3), (1,4), (1,5), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (4,1), (4,2), (5,1), (3,4), (3,5), (3,6), (4,3), (5,3), (6,3)\}$

10. We can associate a natural number with each star and can continue the process indefinitely.

11.

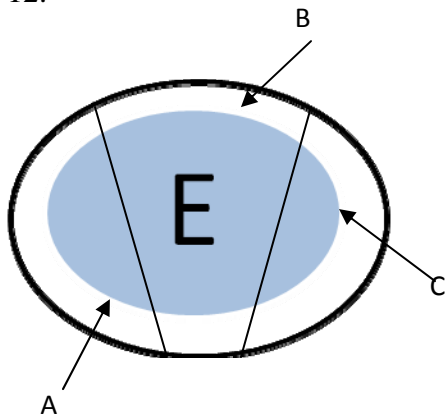
$$E_1 = \{x \mid x \text{ is a club}\}$$

$$E_2 = \{x \mid x \text{ is a diamond}\}$$

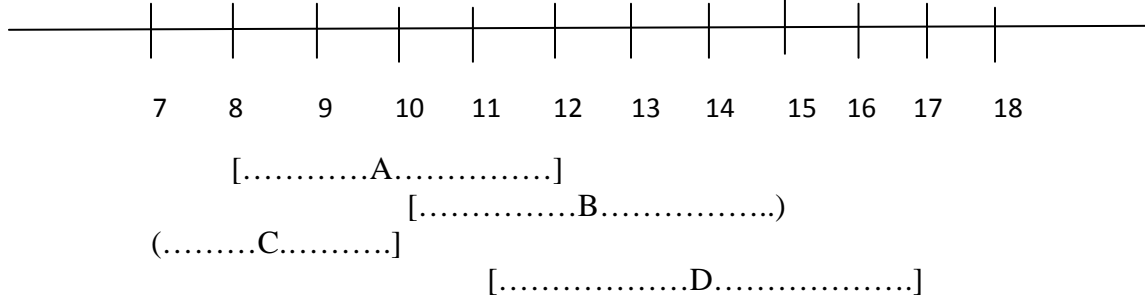
$$E_3 = \{x \mid x \text{ is a heart}\}$$

$$E_4 = \{x \mid x \text{ is a spade}\}$$

12.



13.



14.

- $Y_2 \cup Y_3$  voters 2 and/or 3 say the transmission is accurate
- $Y_1 \cup Y_2 \cup Y_3^c$  voters 1 and/or 2 say the transmission is accurate while voter 3 says it is not
- $(Y_1 \cup Y_3)^c$  neither voter 2 nor 3 say the transmission is accurate
- $(Y_1 \cup Y_2 \cup Y_3)^c$  none of the voters say the transmission is accurate
- $Y_1 \cap Y_2$  voters 1 and 2 say the transmission is accurate
- $Y_2^c \cap Y_3$  voter 2 says the transmission is not accurate and voter 3 says the transmission is accurate
- $(Y_1 \cap Y_2 \cap Y_3)^c$  not all of the voters say the transmission is accurate
- $Y_1^c \cap Y_2^c$  voters 1 and 2 say the transmission is not accurate

15.  $\Omega = \{x \mid 0 \leq x \leq 80 \text{ mph}\}$ ,  $A$  corresponds to a rush hour traffic jam,  $B$  may correspond to dense rush hour traffic, and  $C$  corresponds to mid-day or evening traffic flow.

### Chapter 3

1. A random experiment consists of measuring the weight of the carbon dioxide emitted by a coal fired power plant during a 4 hour period. Identify the sample space for this experiment.

$$\Omega = \{x \mid 0 \leq x \leq M\}$$

where  $M$  is a large number on the order of thousands.

2. An experiment consists of selecting an acre of land in the Jefferson National Forest at random and counting the number of Cardinal nests in that parcel of land. Identify the sample space for this experiment.

$$\Omega = \{x \mid 0 \leq x \leq K, x \text{ integer}\}$$

where  $K$  is a suitably large number – probably on the order of tens.

3. An experiment consists of measuring the speed of randomly selected southbound vehicles as they pass mile marker 118 on Interstate Highway 81. Identify the sample space for this experiment.