Solutions for
Assignment 1 : Chapter2 , questions 2, 6, 8, 12, 16, 20, 26

2.

    a. Event A = { RRR, LLL, SSS }

    b. Event B = { RLS, RSL, LRS, LSR, SRL, SLR }

    c. Event C = { RRL, RRS, RLR, RSR, LRR, SRR }

    d. Event D = { RRL, RRS, RLR, RSR, LRR, SRR, LLR, LLS, LRL, LSL, RLL, SLL, SSR, SSL, SRS, SLS, RSS, LSS }

    e. Event D′ contains outcomes where all cars go the same direction, or they all go different directions:
        D′ = { RRR, LLL, SSS, RLS, RSL, LRS, LSR, SRL, SLR }

        Because Event D totally encloses Event C, the compound event C∪D = D:
        C∪D = { RRL, RRS, RLR, RSR, LRR, SRR, LLR, LLS, LRL, LSL, RLL, SLL, SSR, SSL, SRS, SLS, RSS, LSS }

        Using similar reasoning, we see that the compound event C∩D = C:
        C∩D = { RRL, RRS, RLR, RSR, LRR, SRR }

6.
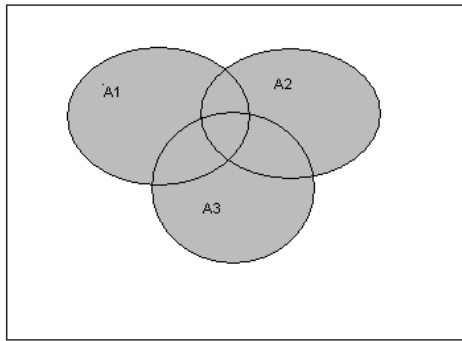
    a.

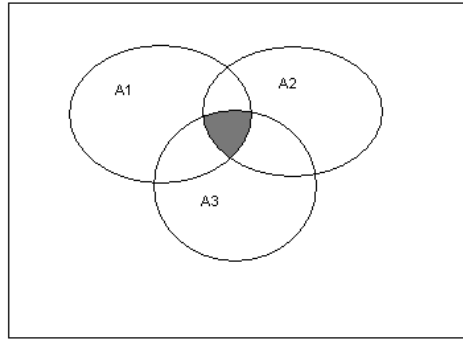| Outcome Number	Outcome
1	123
2	124
3	125
4	213
5	214
6	215
7	13
8	14
9	15
10	23
11	24
12	25
13	3
14	4
15	5

    b. Outcomes 13, 14, 15

    c. Outcomes 3, 6, 9, 12, 15

    d. Outcomes 10, 11, 12, 13, 14, 15
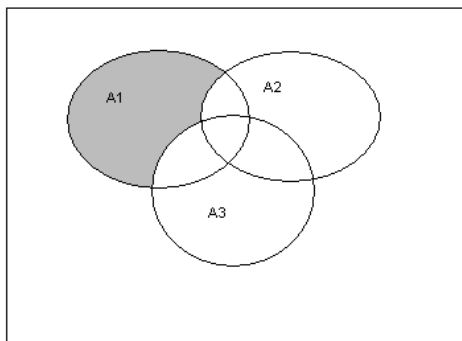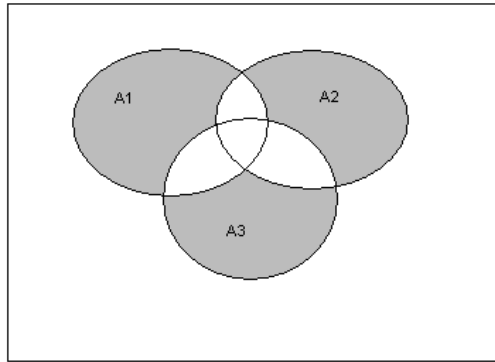
8.

e. $A_1 \cup A_2 \cup A_3$

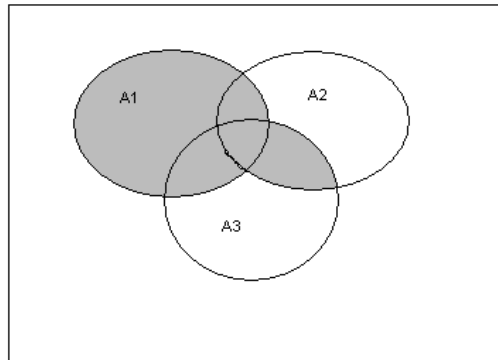**f.** $A_1 \cap A_2 \cap A_3$

g. $A_1 \cap A_2' \cap A_3'$

h. $(A_1 \cap A_2' \cap A_3') \cup (A_1' \cap A_2 \cap A_3') \cup (A_1' \cap A_2' \cap A_3)$

i. $A_1 \cup (A_2 \cap A_3)$

12.

j. $P(A \cup B) = .50 + .40 - .25 = .65$

k. $P(A \cup B)' = 1 - .65 = .35$

l. $A \cap B'$; $P(A \cap B') = P(A) - P(A \cap B) = .50 - .25 = .25$

16.

m.   There are six simple events, corresponding to the outcomes CDP, CPD, DCP, DPC, PCD, and PDC. The probability assigned to each is $\frac{1}{6}$.

n. $P(\text{ C ranked first}) = P(\{CPD, CDP\}) = \frac{1}{3}$

o. $P(\text{ C ranked first and D last}) = P(\{CPD\}) = \frac{1}{6}$

20.

Let S1, S2 and S3 represent the swing and night shifts, respectively. Let C1 and C2 represent the unsafe conditions and unrelated to conditions, respectively.

p.   The simple events are $\{S1,C1\}, \{S1,C2\}, \{S2,C1\}, \{S2,C2\},\{S3,C1\}, \{S3,C2\}$.

q. $P(\{C1\}) = P(\{S1,C1\},\{S2,C1\},\{S3,C1\}) = .10 + .08 + .05 = .23$

r. $P(\{S1\}') = 1 - P(\{S1,C1\}, \{S1,C2\}) = 1 - (.10 + .35) = .55$

26.

s. $P(A_1') = 1 - P(A_1) = 1 - .12 = .88$

t. $P(A_1 \cap A_2) = P(A_1) + P(A_2) - P(A_1 \cup A_2) = .12 + .07 - .13 = .06$

u. $P(A_1 \cap A_2 \cap A_3') = P(A_1 \cap A_2) - P(A_1 \cap A_2 \cap A_3) = .06 - .01 = .05$

v.   P(at most two errors) $= 1 - P(\text{all three types})$
$$= 1 - P(A_1 \cap A_2 \cap A_3)$$
$$= 1 - .01 = .99$$