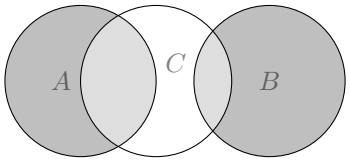
Math 327 Homework 2 Anchu A. Lee

2.4

1. $S = \{(1,1),(1,2),(1,3),(1,4),(1,5),(1,6),(2,1),(2,2),(2,3),(2,4),(2,5),(2,6)$
   $(3,1),(3,2),(3,3),(3,4),(3,5),(3,6),(4,1),(4,2),(4,3),(4,4),(4,5),(4,6)$
   $(5,1),(5,2),(5,3),(5,4),(5,5),(5,6),(6,1),(6,2),(6,3),(6,4),(6,5),(6,6)\}$
2. $S = \{x, y \mid 0 \leq x \leq 6, 0 \leq y \leq 6\}$

2.6
$S = \{A_1A_2, A_1A_3, A_1A_4, A_2A_3, A_2A_4, A_3A_4\}$

2.8

1. $A = \{(3,6),(4,5),(4,6),(5,4),(5,5),(5.6),(6,3),(6,4),(6,5),(6,6)\}$
2. $B = \{(1,2),(2,1),(2,2),(2,3),(2,4),(2,5),(2,6),(3,2),(4,2),(5,2),(6,2)\}$
3. $C = \{(5,1),(5,2),(5,3),(5,4),(5,5),(5,6),(6,1),(6,2),(6,3),(6,4),(6,5),(6,6)\}$
4. $A \cap C = \{(5,4),(5,5),(5.6),(6,3),(6,4),(6,5),(6,6)\}$
5. $A \cap B = \{\emptyset\}$
6. $B \cap C = \{(5,2),(6,2)\}$
7. 

2.10

1. $S = \{NNN, NNF, NFN, NFF, FNN, FNF, FFN, FFF\}$
2. $E = \{NFF, FNF, FFN, FFF\}$
3. The second river is always safe to fish.

2.14

1. $A \cup C = \{0,2,3,4,5,6,8\}$
2. $A \cap B = \{\emptyset\}$
3. $C' = \{0,1,6,7,8,9\}$
4. $(C' \cap D) \cup B = \{1,3,5,6,7,9\}$
5. $(S \cap C)' = \{0,1,6,7,8,9\}$
6. $A \cap C \cap D' = \{2,4\}$

2.16

1. $M \cup N = \{x \mid 0 < x < 9\}$
2. $M \cap N = \{x \mid 1 < x < 5\}$
3. $M' \cap N \ = \{x \mid 9 < x < 12\}$

2.22
$8 \cdot 3 = 24$ classifications

2.26

1. $\binom{7}{5} = 21$ ways
2. $\binom{5}{3} = 10$ ways

2.28
$5 \cdot 3 \cdot 2 = 30$ different ways

2.30
$9^2 = 72$ ways

2.34

1. $7! = 5040$
2. $6! = 720$

2.38

- $8! = 40320$
- $4! \cdot 2^4 = 384$
- $4! \cdot 4! = 576$

2.46
$\frac{9!}{3!4!2!} = 1260$

2.50

- $P(A) = \frac{10}{36}$
- $P(C) = \frac{12}{36}$
- $P(A \cap C) = \frac{7}{36}$

2.52

- $210 - 122 = 88$
  $\frac{88}{500}$
- $83 - 52 = 31$
  $\frac{31}{500}$
- $500 - (210 + 216 - 97) = 171$
  $\frac{171}{500}$

2.56

- $0.25 + 0.17 - 0.15 = 0.27$
- $1 - (0.25 + 0.17 - 0.15) = 0.73$

2.58

- $\frac{5}{36}$
- $\frac{10}{36}$

2.64

- $1 - 0.42 = 0.58$
- $1 - 0.04 = 0.96$

2.74
$\frac{10}{18}$

2.80

- $\frac{0.15}{0.25} = 0.56$
- $\frac{0.15}{0.40} = 0.35$

2.86

1. 0.43
2. $0.53 \cdot 0.22 = 0.12$ (0.1166)

2.90

- $P(A \cap B \cap C) = 0.20 \cdot 0.75 \cdot 0.3 = 0.045$
- $P(B' \cap C) = P(C \mid A \cap B') \cdot P(B' \mid A) \cdot P(A) + P(C \mid A' \cap B') \cdot P(B' \mid A') \cdot P(A') = 0.564$
- $P(C) = P(A \cap B \cap C) + P(A \cap B' \cap C) + P(A' \cap B \cap C) + P(A' \cap B' \cap C) = 0.630$

2.92 $0.95 \cdot (1 - 0.3 \cdot 0.2) \cdot 0.9 = 0.8037$

2.96
Let R represent the probability of getting a ticket. W_i is the probabilities of the person getting a ticket for speeding on the way to work.
$P(R) = \sum_{i=1}^{4} P(L_i) \cdot P(W_i) = 0.40 \cdot 0.20 + 0.30 \cdot 0.10 + 0.20 \cdot 0.50 + 0.30 \cdot 0.20 = 0.27$

2.98
$P(L_2) = \frac{P(R \cap W_2)}{R} = \frac{0.03}{0.27}$

2.104

- $4 \cdot (0.5)^4 = 0.25$
- $(0.5)^4 = 0.0625$

2.118
C = having cancer and T = tested positive.
$P(C) = 0.07, P(T' \mid C) = 0.1, P(T \mid C') = 0.05$
$P(C \mid T') = \frac{P(T'|C) \cdot P(C)}{P(T'|C) \cdot P(C) + P(T'|C') \cdot P(C')} = \frac{0.1 \cdot 0.07}{0.1 \cdot 0.07 + (1-0.05) \cdot (1-0.07)} = 0.00786...$

2.124
$P(T) = 0.5$ probability of being trained
Q = meeting quota. $P(Q \mid T) = 0.9$, $P(Q \mid T') = 0.65$
$P(T \mid Q) = \frac{P(Q|T) \cdot P(T)}{P(Q|T) \cdot P(Q) + P(Q|T') \cdot P(T')} = \frac{0.9 \cdot 0.5}{0.9 \cdot 0.5 + 0.65 \cdot 0.5} = 0.58064...$