

## Chapter 2 Answers's

2.1 (a)  $S = \{8, 16, 24, 32, 40, 48\}$ .

(b) For  $x^2 + 4x - 5 = (x + 5)(x - 1) = 0$ , the only solutions are  $x = -5$  and  $x = 1$ .

$S = \{-5, 1\}$ .

(c)  $S = \{T, HT, HHT, HHH\}$ .

(d)  $S = \{N. America, S. America, Europe, Asia, Africa, Australia, Antarctica\}$ .

(e) Solving  $2x - 4 \geq 0$  gives  $x \geq 2$ . Since we must also have  $x < 1$ , it follows that  $S = \phi$ .

2.2  $S = \{(x, y) \mid x^2 + y^2 < 9; x \geq 0, y \geq 0\}$ .

2.3 (a)  $A = \{1, 3\}$ .

(b)  $B = \{1, 2, 3, 4, 5, 6\}$ .

(c)  $C = \{x \mid x^2 - 4x + 3 = 0\} = \{x \mid (x - 1)(x - 3) = 0\} = \{1, 3\}$ .

(d)  $D = \{0, 1, 2, 3, 4, 5, 6\}$ . Clearly,  $A = C$ .

2.4 (a)  $S = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$ .

(b)  $S = \{(x, y) \mid 1 \leq x, y \leq 6\}$ .

2.5  $S = \{1HH, 1HT, 1TH, 1TT, 2H, 2T, 3HH, 3HT, 3TH, 3TT, 4H, 4T, 5HH, 5HT, 5TH, 5TT, 6H, 6T\}$ .

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

2.7  $S_1 = \{MMMM, MMMF, MMFM, MFMM, FMMM, MMFF, MFMF, MFFM, FMFM, FFMM, FMMF, MFFF, FMFF, FFMF, FFFM, FFFF\}$ .

$S_2 = \{0, 1, 2, 3, 4\}$ .

2.8 (a)  $A = \{(3, 6), (4, 5), (4, 6), (5, 4), (5, 5), (5, 6), (6, 3), (6, 4), (6, 5), (6, 6)\}$ .

(b)  $B = \{(1, 2), (2, 2), (3, 2), (4, 2), (5, 2), (6, 2), (2, 1), (2, 3), (2, 4), (2, 5), (2, 6)\}$ .

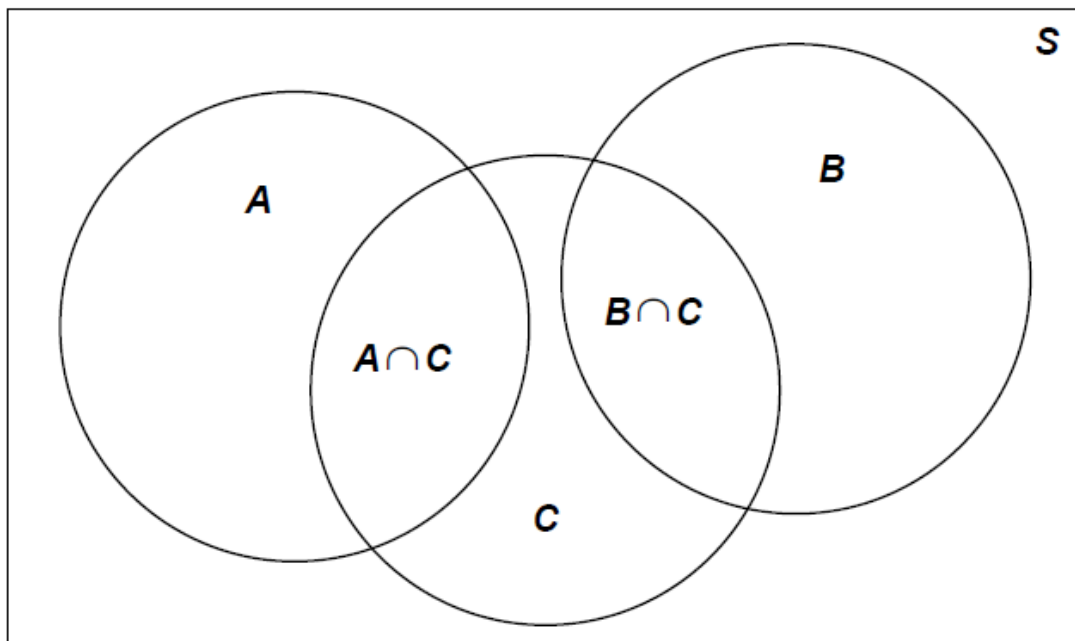
(c)  $C = \{(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$ .

(d)  $A \cap C = \{(5, 4), (5, 5), (5, 6), (6, 3), (6, 4), (6, 5), (6, 6)\}$ .

(e)  $A \cap B = \phi$ .

(f)  $B \cap C = \{(5, 2), (6, 2)\}$ .

(g) A Venn diagram is shown below:



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2.9 (a)  $A = \{1HH, 1HT, 1TH, 1TT, 2H, 2T\}$ .

(b)  $B = \{1TT, 3TT, 5TT\}$ .

(c)  $A' = \{3HH, 3HT, 3TH, 3TT, 4H, 4T, 5HH, 5HT, 5TH, 5TT, 6H, 6T\}$ .

(d)  $A' \cap B = \{3TT, 5TT\}$ .

(e)  $A \cup B = \{1HH, 1HT, 1TH, 1TT, 2H, 2T, 3TT, 5TT\}$ .

2.10 (a)  $S = \{FFF, FFN, FNF, NFF, FNN, NFN, NNF, NNN\}$ .

(b)  $E = \{FFF, FFN, FNF, NFF\}$ .

(c) The second river was safe for fishing.

2.11 (a)  $S = \{M_1M_2, M_1F_1, M_1F_2, M_2M_1, M_2F_1, M_2F_2, F_1M_1, F_1M_2, F_1F_2, F_2M_1, F_2M_2, F_2F_1\}$ .

(b)  $A = \{M_1M_2, M_1F_1, M_1F_2, M_2M_1, M_2F_1, M_2F_2\}$ .

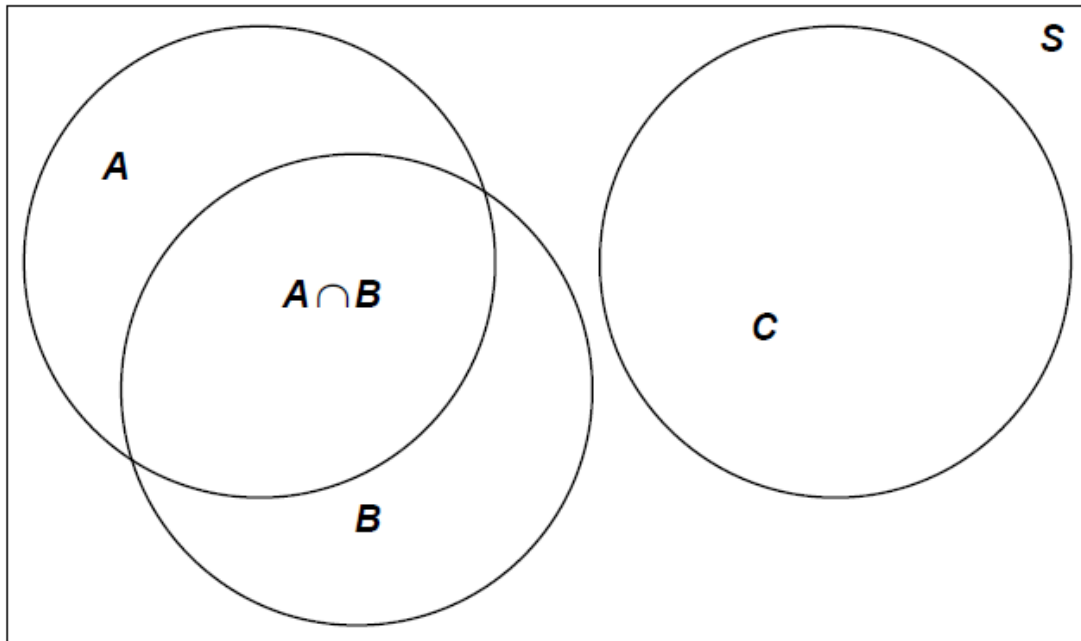
(c)  $B = \{M_1F_1, M_1F_2, M_2F_1, M_2F_2, F_1M_1, F_1M_2, F_2M_1, F_2M_2\}$ .

(d)  $C = \{F_1F_2, F_2F_1\}$ .

(e)  $A \cap B = \{M_1F_1, M_1F_2, M_2F_1, M_2F_2\}$ .

(f)  $A \cup C = \{M_1M_2, M_1F_1, M_1F_2, M_2M_1, M_2F_1, M_2F_2, F_1F_2, F_2F_1\}$ .

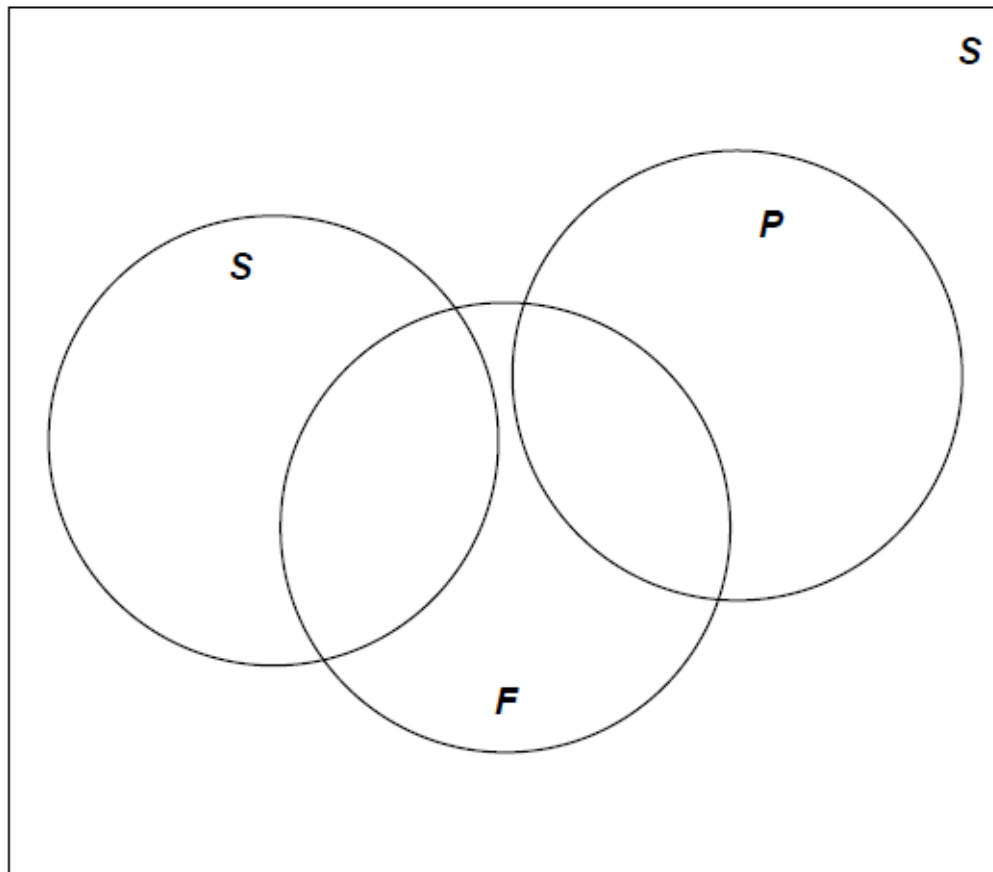
(g)



2.12 (a)  $S = \{ZY F, ZNF, WY F, WNF, SY F, SNF, ZYM\}$ .

(b)  $A \cup B = \{ZY F, ZNF, WY F, WNF, SY F, SNF\} = A$ .

(c)  $A \cap B = \{WY F, SY F\}$ .



2.13

2.14 (a)  $A \cup C = \{0, 2, 3, 4, 5, 6, 8\}$ .

(b)  $A \cap B = \phi$ .

(c)  $C = \{0, 1, 6, 7, 8, 9\}$ .

(d)  $C \cap D = \{1, 6, 7\}$ , so  $(C \cap D) \cup B = \{1, 3, 5, 6, 7, 9\}$ .

(e)  $(S \cap C)^c = C^c = \{0, 1, 6, 7, 8, 9\}$ .

(f)  $A \cap C = \{2, 4\}$ , so  $A \cap C \cap D^c = \{2, 4\}$ .

2.15 (a)  $A^c = \{\text{nitrogen, potassium, uranium, oxygen}\}$ .

(b)  $A \cup C = \{\text{copper, sodium, zinc, oxygen}\}$ .

(c)  $A \cap B^c = \{\text{copper, zinc}\}$  and

$C = \{\text{copper, sodium, nitrogen, potassium, uranium, zinc}\};$

so  $(A \cap B) \cup C = \{\text{copper, sodium, nitrogen, potassium, uranium, zinc}\}.$

(d)  $B \cap C = \{\text{copper, uranium, zinc}\}.$

(e)  $A \cap B \cap C = \phi .$

(f)  $A \cup B = \{\text{copper, nitrogen, potassium, uranium, oxygen, zinc}\}$  and

$A \cap C = \{\text{oxygen}\};$  so,  $(A \cup B) \cap (A \cap C) = \{\text{oxygen}\}.$

2.16 (a)  $M \cup N = \{x \mid 0 < x < 9\}.$

(b)  $M \cap N = \{x \mid 1 < x < 5\}.$

(c)  $M \cap N = \{x \mid 9 < x < 12\}.$

2.18 (a) Not mutually exclusive.

(b) Mutually exclusive.

(c) Not mutually exclusive.

(d) Mutually exclusive.

2.20 (a) 6;

(b) 2;

(c) 2, 5, 6;

(d) 4, 5, 6, 8.

2.21 18 ways

2.22 24 classifications.

2.23 156 points in S.

2.24 8 possible classifications

2.25 20 different pairs of shoes.

2.26 (a) 21 ways.

(b) 10 ways

2.27 48 different house plans available.

2.28 30 different ways to prescribe a drug for asthma.

2.29 210 test runs

2.30 512 ways to answer the test.

2.31 (a) 1024 ways to answer the test.

(b) 243 ways to answer the test and get all questions wrong.

2.32 (a) 5040

(b) 720

2.36 (a) 150 three digit numbers

(b) 75 three digit odd numbers.

(c) 105.

2.39 (a) 40320

(b) 336.

2.45 3360.

2.46 1260

2.47 7920

2.48 4410.

2.55 (a) = 0. 3.

(b)= 0.2

2.59 (10/117)

2.61 (95/663)

2.62 (a) 1/ 3

(b) 5/14

2.63 (a) (94/54145)

(b) (143/39984)

2.64  $(25/1296)$

2.70 (a) 32%;  
(b) 87%  
(c) 13%  
(d) 63%

2.81 (a)  $5/34$  ;  
(b)  $3/8$

2.84 (a) 0.56.  
(b) 0.35

2.85 (a) 0.35.  
(b) 0.875  
(c) 0.55.

2.86 (a) 0.34.  
(b)  $(5/7)$   
(c)  $(1/12)$

2.91  $P[A \cup (A' \cap B)] = 0.625.$