

## Homework Solutions - Section 9.2

2. Use figure 1(a) on page 360

(a)  $P(\text{sum} \leq 7) = (1/36)(1+2+3+4+5+6) = 21/36 = 7/12$

(b)  $P(5 \leq \text{sum} \leq 10) = (1/36)(4+5+6+5+4+3) = 27/36 = 3/4$

(c)  $P(\text{sum} = 3, 6, 9, \text{ or } 12) = (1/36)(2+5+4+1) = 12/36 = 1/3$

3. X and Y are independent events

(a)  $P(X=0 \text{ and } Y=2) = P(X=0) P(Y=2) = 1/4 \cdot 1/2 = 1/8$

(b)  $P(X=0 \text{ or } Y=2) = P(X=0) + P(Y=2) - P(X=0) P(Y=2) = 1/4 + 1/2 - 1/8 = 5/8$

(c)  $P(X \leq 1 \text{ and } Y \geq 1) = P(X=0 \text{ or } X=1) P(Y=1 \text{ or } Y=2)$   
 $= (1/4 + 1/4)(1/4 + 1/2) = 3/8$

5.

(a)  $\{0, 1, 2, 3, 4\}$

(b)  $P(X + Y = 2)$

$$= P(X=0 \text{ and } Y=2) + P(X=1 \text{ and } Y=1) + P(X=2 \text{ and } Y=0)$$

$$= (1/4 \cdot 1/2) + (1/4 \cdot 1/4) + (1/2 \cdot 1/4) = 5/16$$

(c)

$$P(X + Y = 0) = 1/16$$

$$P(X + Y = 1) = 1/8$$

$$P(X + Y = 2) = 5/16$$

$$P(X + Y = 3) = 1/4$$

$$P(X + Y = 4) = 1/4$$

11.

(a) the value set of W is P

(b)

$$P(W = 1) = 1/6$$

$$P(W = 2) = 5/6 \cdot 1/6$$

$$P(W = 3) = 5/6 \cdot 5/6 \cdot 1/6$$

...

$$P(W = k) = (5/6)^{k-1} \cdot 1/6 \quad \text{for } k \in P$$

9.

The value set is  $\{2,3,4,5\}$ .

The numbers of ways to choose 7 marbles from 10 is  $\binom{10}{7} = \frac{10 \cdot 9 \cdot 8}{3 \cdot 2 \cdot 1} = 120$

(a) There are  $\binom{5}{2} \binom{5}{5} = 10$  ways to choose 2 red balls

The probability is  $10/120 = 1/12$

(b) There are  $\binom{5}{3} \binom{5}{4} = 10 \cdot 5 = 50$  ways to choose 3 red balls

The probability is  $50/120 = 5/12$

(c) There are  $\binom{5}{4} \binom{5}{3} = 5 \cdot 10 = 50$  ways to choose 4 red balls

The probability is  $50/120 = 5/12$

(d) There are  $\binom{5}{5} \binom{5}{2} = 10$  ways to choose 5 red balls

The probability is  $10/120 = 1/12$