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1. Textbook 3.3.3

   (a)

   (b)

   (c)

2. Textbook 3.3.5

3. Suppose a die is rolled one time. Let

$$A = \text{roll a 1} \qquad B = \text{roll an even}$$

   (a) Are A and B are mutually exclusive? Why?

(b) Are A and B are independent? Why? *Use one of the mathematical checks for independence.*

4. Suppose that 20% of UI students smoke (S), while 30% drink alcohol (A). In addition, 15% smoke *and* drink alcohol.

   (a) Given that a student drinks alcohol (A), determine the probability that he/she smokes (S), i.e. find $P(S|A)$.

   (b) Are alcohol use and smoking independent? Why? *Use one of the mathematical checks for independence.*

5. Suppose a die is rolled. Consider the following events:

$$A = 2, 4 \text{ or } 6 \text{ is rolled}$$
$$B = 1, 2 \text{ or } 5 \text{ is rolled}$$
$$C = 3 \text{ or } 5 \text{ is rolled}$$

   (a) Are A and B are mutually exclusive? Why?

   (b) Are A and C are mutually exclusive? Why?

   (c) Find $P(A|B)$

(d) Find $P(B \cup C)$.

(e) Are A and B independent? Why? *Use one of the mathematical checks for independence.*

(f) Are B and C independent? Why? *Use one of the mathematical checks for independence.*

6. Suppose events A and B are independent where $P(A) = 0.3$ and $P(B|A) = 0.5$. Find $P(A \cup B)$.

7. Suppose events A and B are mutually exclusive where $P(A) = 0.5$ and $P(B) = 0.2$. What is $P(A \cap B)$?

8. Suppose a doctors travel bag (from the year 1880) contains 12 silver coins (S) and 3 gold coins (G) (these were payments from his patients).

   (a) If you randomly select 2 coins *without* replacement, determine the probability that the first coin is silver (S_1) *and* the second coin is gold (G_2).

   (b) Suppose you randomly select 2 coins *without* replacement. Use the complement rule to find the probability that 1 or fewer gold coins are selected.

   (c) If you randomly select 2 coins *without* replacement, determine the probability that you obtain exactly 1 gold coin (G). *Hint:* $P[(G_1 \cap S_2) \cup (...)]$.