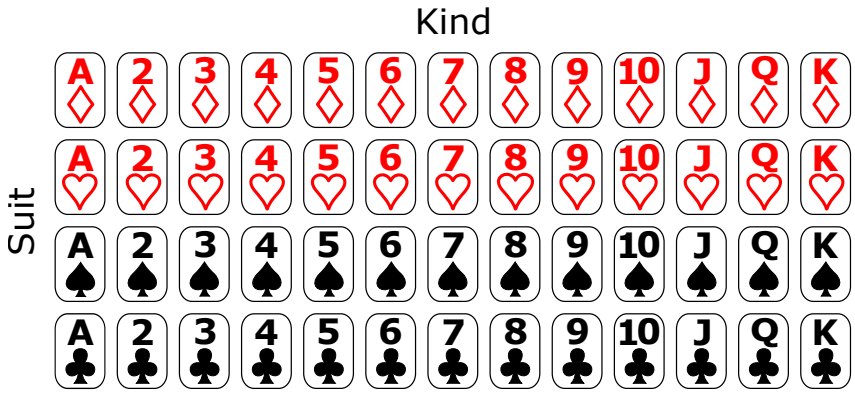
Conditional Probability Homework

Text: 3.2, 3.3

Last Name	First Name	Date



The game of Texas Holdem starts with every player receiving 2 random cards from the standard deck of 52 cards. Alice is impatient, so she opens her cards one by one, which results in a sample space with 52×51 outcomes. Use the conditional probability multiplication rule to find the chances for the following events. State your answers in decimal notation.

1. Both cards are red

2. Both cards are hearts

3. Both cards are Queens

4. The cards are of the same suit

5. The cards are of different suits

6. The cards are suited Ace and King

In a game of Five Card Draw, a player gets 5 random cards out of the standard 52-card deck.

7. Find the probability of drawing a flush, which is 5 cards of the same suit.

8. Find the probability of drawing 5 cards such that no two of them are of the same kind.

Suppose that A and B are events with:

$$P(A) = 0.15, \quad P(A \cap B) = 0.03, \quad P(A|B) = 0.12$$

9. Show that $P(B) = 0.25$

10. Assuming that $P(B) = 0.25$, find $P(A \cup B)$

11. Find $P(B|A)$

12. Are events A and B independent? Explain.

Let U and V be mutually exclusive events, with $P(U) = 0.26$ and $P(V) = 0.37$. Find:

13. $P(U \cup V)$

14. $P(U \cap V)$

15. $P(U \mid V)$

16. Are the events U and V independent?

17. Let Q and R are independent events with $P(Q) = 0.4$ and $P(Q \cap R) = 0.1$. Find $P(R)$.

18. Let J and K be independent events with $P(J \mid K) = 0.3$. Find $P(J)$.

19. Toss a fair six-sided die 5 times (alternatively, toss 5 different dice once). What are the chances that all 5 rolls come up as 6? *Yahtzee!*

20. Every job applicant at Acme Corp marketing division must pass 2 job interviews, and the only way to advance to the 2nd interview is to pass the first one. The records show that 2.4% of all applicants pass both interviews and get hired. The records also show that applicants who pass the 1st interview have a 14% chance of passing the 2nd interview. What are the chances of passing the 1st interview?

At a college, 72% of courses have final exams and 46% of courses require research papers. Suppose that 32% of courses have a research paper and a final exam.

21. Find the probability that a course has a final exam or a research project.

22. Find the probability that a course has neither of these two requirements.

Suppose that you have eight cards. Five are green and three are yellow. The five green cards are numbered 1, 2, 3, 4, and 5. The three yellow cards are numbered 1, 2, and 3. You shuffle the cards well and randomly draw one card. Let G be the event that the drawn card is green, and let $E =$ the drawn card is even-numbered.

23. Describe the sample space.

24. Find $P(G)$.

25. Find $P(E)$.

26. Find $P(G \cap E)$.

27. Find $P(G \cup E)$.

28. Find $P(G|E)$.

29. Find $P(E|G)$.

30. Are G and E independent? Explain.

United Blood Services is a blood bank that serves more than 500 hospitals in 18 states. According to their website, a person with type O blood and a negative Rh factor (Rh-) can donate blood to any person with any blood type. Their data show that 43% of people have type O blood and 15% of people have Rh- factor; 52% of people have type O or Rh- factor.

31. Find the probability that a person has both type O blood and the Rh- factor.

32. Find the probability that a person does not have both type O blood and the Rh- factor.

ANSWERS

1. 0.245098

3. 0.004524887

5. 0.7647059

7. 0.001980792

9. By definition, $P(A|B) = \dfrac{P(A \cap B)}{P(B)}$, and therefore $P(B) = \dfrac{P(A \cap B)}{P(A|B)} = \dfrac{0.03}{0.12} = 0.25$

11. $P(B|A) = \dfrac{P(B \cap A)}{P(A)} = \dfrac{0.03}{0.15} = 0.2$

13. 0.63

15. 0

17. 0.25

19. 0.0001286008

21. 0.86

23. $\{g_1, g_2, g_3, g_4, g_5, y_1, y_2, y_3\}$, where green cards are g_i and yellow cards are y_i.

25. 3/8

27. 3/4

29. 2/5

31. 0.06