

T102 CHAPTER 7 REVIEW PROBLEMS

This is only a sampling of possible exam questions. Be sure to review all notes, homework problems, and textbook review.

- A spinner can land on four different colors: red-R, green-G, yellow-Y and blue-B. If we assume the spinner is not divided equally, which of the following probability assignments would have to be rejected and why?

 - $P(R) = .15$ $P(G) = -.35$ $P(Y) = .50$ $P(B) = .70$
 - $P(R) = .32$ $P(G) = .28$ $P(Y) = .24$ $P(B) = .30$
 - $P(R) = .26$ $P(G) = .14$ $P(Y) = .30$ $P(B) = .30$
- A thumbtack is tossed 1,000 times with the following outcome frequencies: point down = 389 and point up = 611. Compute the approximate empirical probability for each outcome. Does each outcome appear equally likely?
- An experiment consists of tossing a regular die with faces number 1 through 6. Consider the events

 - E: Obtain an even number
 - F: Obtain a prime number
 - G: Obtain an odd number
 - Find $P(E \cup F)$ and $P(E) + P(F)$ Why are they different?
 - Find $P(E \cup G)$ and $P(E) + P(G)$ Why are they the same?
- If we select a card from an ordinary deck of 52 cards and then select another card without replacing the first, find the probability of selecting 2 face cards.
- Box 1 contains 2 red marbles and one blue marble. Box 2 contains one green, 2 yellow and one red marble. Consider the experiment of selecting one marble from the first box and one from the second.

 - Sketch a probability tree. Show all possible outcomes and their probabilities.
 - What is the probability of selecting two red marbles?
 - What is the probability of selecting at least one red marble?
- An experiment consists of tossing a coin three times and recording the sequence of heads and tails. For each event described, find its probability

 - $P(\text{More than one head})$
 - $P(\text{An even number of heads})$
 - $P(\text{A head on the last toss})$
- A spinner has three letters on it: A, B, and C. For any spin the letter B is twice as likely to occur as the letter A, and the letter C is three times as likely to occur as letter A.

 - Sketch such a spinner.
 - Find the simple event probabilities for the experiment of spinning the spinner once.

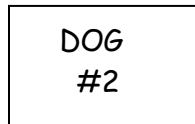
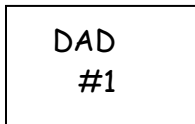
8. The probability that a first proposal passes is $\frac{3}{7}$.
 - a) What are the odds in favor of the first proposal passing?
 - b) What are the odds against the first proposal passing?
9.
 - a) If you flipped a fair coin 9 times and got 9 heads, what would be the probability of getting a head on the next toss?
 - b) If you rolled a fair die 5 times and got the numbers 1, 2, 3, 4, and 5, what would be the probability of rolling a 6 on the next turn.
10. Suppose there are 3 red, 4 blue, and 5 green chips in a box and you win by selecting either a red or green chip. If you get a red chip you win \$4, a green chip pays you \$3. What is the expected value of this game if it costs you \$3.50 to play? Is it a fair game? Why?
11. An experiment consists of rolling two fair dice and adding the dots on the two sides facing up.
 - a) Find the probability that the sum is either a 2, 3, or 12.
 - b) Find the probability that the sum is a 7 given that the sum is less than 8.
12. The probability of winning a certain raffle is $\frac{1}{600}$. Find the odds against winning.
13. A consumer buys a package of 5 light bulbs not knowing that 1 of the bulbs is bad. List the outcomes in the sample space if 2 bulbs are selected randomly and then find the probabilities of the following events.
 - a) Both bulbs are good
 - b) At least one of the bulbs is bad
14. A game consists of the following: a single fair die is rolled and you are paid back the number of dollars corresponding to the number of dots facing up.
 - a) What is the expected value of this game?
 - b) If you pay \$4.00 to play the game, is it a fair game?
15. In a horse race, how many different finishes are possible among the first 3 places if 10 horses are running? (exclude ties)
16. Eight distinct points are selected on the circumference of a circle. How many triangles can be drawn using these points as vertices?
17. The probability of living to age 65 is $\frac{7}{10}$. Find the odds in favor of living to age 65.
18. A box contains 4 black and 2 purple marbles. Consider the experiment of randomly selecting a marble from the box, and then selecting a second marble, without replacing the first. Determine the probabilities of the following events by using a complete tree diagram.
 - a) Selecting 2 black marbles
 - b) Selecting one black and 1 purple marble
 - c) Selecting 2 purple marbles

19. If there are 25 applicants for a job, in how many ways can a manager select a first, second and third choice candidate for the position?
20. If there are 25 applicants for a job, in how many ways can a manager choose three individuals to be interviewed?
21. A bag contains 6 chocolates, 4 caramels, and 5 peppermints. Johnny reaches blindly into the bag and withdraws treat.
- What is the probability that he gets a chocolate?
 - What is the probability that he does not get a peppermint?
 - What is the probability that he gets a chocolate or a peppermint?
22. Suppose $P(A) = 0.35$, $P(B) = 0.51$ and $P(A \cap B) = 0.17$. Complete:
- $P(\bar{A})$
 - $P(A \text{ or } B)$
23. The letters r, e, a, and p are inscribed on four cards and placed in a hat. They are drawn one at a time and arranged according to the order drawn.
- Count the number of possible arrangements
 - What is the probability that the arrangement will have two vowels adjacent to one another?
24. A card is drawn from a standard deck. What is the probability that it is a king or a spade?
25. A box contains 7 white balls and 3 black balls. One ball is drawn, then replaced, and a second ball is drawn. What is the probability of getting two white balls?
26. Two dice are tossed. What is the probability that the sum of the two numbers is:
- Greater than ten?
 - Equal to nine?
27. A container contains 8 red marbles, 4 blue marbles, and 3 white marbles.
- If one marble is drawn at random from the container, find the probability that it is red.
 - If two marbles are drawn, one at a time, without replacement, find the probability that they are both the same color.
 - If two marbles are drawn, one at a time with replacement, find the probability that they are both the same color.
28. If A and B are mutually exclusive events and if $P(A) = 0.22$ and $P(B) = 0.34$,
- What is $P(A \cup B)$?
 - What is $P(A \cap B)$?

29. If a letter is drawn from container 1, shown below, and placed in container 2, and then a letter is drawn from container 2, what is the probability that the last letter drawn
- is an A?
 - is a T?
 - is an R?



30.
 - If a couple plans to have 3 children, what is the probability of having at least 2 girls?
 - If a couple plans to have 8 children, what is the probability of having no girls?
 - If a couple plans to have 8 children, what is the probability of having at least 1 girl?
31. For the container below, select a container at random, and then select a letter from the chosen container. What is the probability that the letter chosen is a D?



32. Ten female and eight male applicants have been screened for 5 similar positions in a law firm.
- How many ways can 3 females and 2 males be selected?
 - How many ways can 5 females be selected?
 - What is the probability that 5 females are selected?
 - What is the probability that at least one male is selected?
33. How many ways can you rearrange the letters in the word MISSISSIPPI ?
34. A drawer contains 4 blue socks, 2 white socks, and 6 black socks. If you randomly pull out two socks, one at a time, what is the probability that you will have a matching pair? What is the smallest number of socks you must pull out to guarantee a matching pair?
35. A survey asked 100 seniors at Spartan High School the following questions:
 Do you drive to school?
 Do you favor a rule that would allow only seniors to drive to school?

Of the 60 seniors who drive to school, 40 favored the rule.

Of the 70 seniors who favored the rule, 30 do not drive to school.

- What is the probability that a randomly selected senior will favor the rule?
- What is the probability that a randomly selected senior drives to school and opposes the rule?
- What is the probability that a randomly selected senior opposes the rule or does not drive to school?

ANSWERS

- (a) because the $P(G) < 0$
and (b) because the sum is greater than 1.
- $P(\text{down})=0.389$ and $P(\text{up})= 0.611$, no
- a) $5/6$, 1 because there is an intersection
b) 1, 1 because they are mutually exclusive
- $11/221 = 1/11$
- b. $1/6$
c. $\frac{3}{4}$
- a) $\frac{1}{2}$
b) $\frac{1}{2}$
c) $\frac{1}{2}$
- $P(A) = 1/6$
 $P(B) = 1/3$
 $P(C) = \frac{1}{2}$
- a) 3 : 4
b) 4 : 3
- a) $\frac{1}{2}$
b) $1/6$
- \$2.25 (considering the cost after)
OR \$-1.25 (considering the cost before). No because the cost to play does not equal the expected value OR the expected value does not equal 0.
- a) $1/9$
b) $2/7$
- 599 : 1
- a) $3/5$
b) $2/5$
- a) \$3.50
b) No
- ${}_{10}P_8 = 720$
- ${}_8C_3 = 56$
- 7 : 3
- a) $2/5$
b) $8/15$
c) $1/15$
- ${}_{25}P_3 = 25 \times 24 \times 23 = 13,800$
- ${}_{25}C_3 = 2300$
- a) $2/5$
b) $2/3$
c) $11/15$
- a) 0.65
b) 0.69
- a) 24
b) $\frac{1}{2}$
- $4/13$
- $49/100$
- a) $1/12$
b) $1/9$
- a) $8/15$
b) $37/105$
c) $89/225$
- a) 0.56
b) 0
- a) $1/18$
b) $7/18$
c) $3/18 = 1/6$
- a) $\frac{1}{2}$
b) $(\frac{1}{2})^8 \approx .0039$
c) $1 - (\frac{1}{2})^8 \approx .9961$
- $\frac{1}{2}$
- a) ${}_{10}C_3 \times {}_8C_2 = 3360$
b) ${}_{10}C_5 = 252$
c) ${}_{10}C_5 / {}_{18}C_5 = 252/8568 = 1/34$
d) $P(\text{at least one male})$
 $= 1 - P(\text{no males})$
 $= 1 - P(\text{all females})$
 $= 1 - 1/34$
 $= 33/34$
- 34,650
- $1/3$
4 socks will guarantee a pair.
- a) $70/100 = 7/10$
b) $20/100 = 1/5$
c) $60/100 = 3/5$