Chapter 6 review

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

1. Which of the following pairs of events are disjoint (mutually exclusive)?
(a) A: the odd numbers; B: the number 5
(b) A: the even numbers; B: the numbers greater than 10
(c) A: the numbers less than 5; B: all negative numbers
(d) A: the numbers above 100; B: the numbers less than –200
(e) A: negative numbers; B: odd numbers

2. Which of the following is (are) true?
I. The sum of the probabilities in a probability distribution can be any number between 0 and 1.
II. The probability of the union of two events is the sum of the probabilities of those events.
III. The probability that an event happens is equal to 1 – (the probability that the event does not happen).
(a) I and II only
(b) I and III only
(c) II and III only
(d) I, II, and III
(e) None of the above gives the complete set of true responses.

3. People with type O-negative blood are universal donors. That is, any patient can receive a transfusion of O-negative blood. Only 7.2% of the American population has O-negative blood. If 10 people appear at random to give blood, what is the probability that at least 1 of them is a universal donor?
(a) 0.526
(b) 0.72
(c) 0.28
(d) 0
(e) 1

4. If a peanut M&M is chosen at random, the chances of it being a particular color are shown in the table below.

Color	Brown	Red	Yellow	Green	Orange	Blue
Probability	0.3	0.2	0.2	0.2	0.1	

The probability of randomly drawing a blue peanut M&M is
(a) 0.1.
(b) 0.2.
(c) 0.3.
(d) 1.0.
(e) According to this distribution, it's impossible to draw a blue peanut M&M.

5. If $A \cup B = S$ (sample space), $P(A \text{ and } B^c) = 0.25$, and $P(A^c) = 0.35$, then $P(B) =$
(a) 0.35.
(b) 0.4.
(c) 0.65
(d) 0.75.
(e) None of the above. The answer is ________________.

Questions 6 to 9 are based on this table.

Government data give the following counts of violent deaths in a recent year among people 20 to 24 years of age by sex and cause of death:

	Female	Male
Accidents	1818	6457
Homicide	457	2870
Suicide	345	2152

6. Choose a violent death in this age group at random. The probability that the victim was male is about
(a) 0.81.
(b) 0.78.
(c) 0.59.
(d) 0.46.
(e) 0.19.

7. The conditional probability that the victim was male, given that the death was accidental, is about
(a) 0.46.
(b) 0.48.
(c) 0.56.
(d) 0.78.
(e) 0.81.

8. The conditional probability that the death was accidental, given that the victim was male, is about
(a) 0.81.
(b) 0.56.
(c) 0.78.
(d) 0.48.
(e) 0.46.

9. Let A be the event that a victim of violent death was a woman and B the event that the death was a suicide. The proportion of suicides among violent deaths of women is expressed in probability notation as
(a) 0.132.
(b) 0.138.
(c) $P(\text{A and B})$.
(d) $P(\text{A} \mid \text{B})$.
(e) $P(\text{B} \mid \text{A})$.

10. The chances that you will be ticketed for illegal parking on campus are about 1/3. During the last nine days, you have illegally parked every day and have NOT been ticketed (you lucky person!). Today, on the 10th day, you again decide to park illegally. The chances that you will be caught are
(a) greater than 1/3 because you were not caught in the last nine days.
(b) less than 1/3 because you were not caught in the last nine days.
(c) still equal to 1/3 because the last nine days do not affect the probability.
(d) equal to 1/10 because you were not caught in the last nine days.
(e) equal to 9/10 because you were not caught in the last nine days.

11. An assignment of probabilities must obey which of the following?

(a) The probability of any event must be a number between 0 and 1, inclusive.
(b) The sum of the probabilities of all outcomes in the sample space must be exactly 1.
(c) The probability of an event is the sum of the outcomes in the sample space that make up the event.
(d) All of the above.
(e) Only (a) and (b) are true.

12. Event A occurs with probability 0.2. Event B occurs with probability 0.8. If A and B are disjoint (mutually exclusive), then

(a) P(A and B) = 0.16.
(b) P(A or B) = 1.0.
(c) P(A and B) = 1.0.
(d) P(A or B) = 0.16.
(e) both (a) and (b) are true.

13. A fair coin is tossed four times, and each time the coin lands heads up. If the coin is then tossed 1996 more times, how many heads are most likely to appear for these 1996 additional tosses?

(a) 996
(b) 998
(c) 1000
(d) 1996
(e) None of the above. The answer is ___________________________.

14. A die is loaded so that the number 6 comes up three times as often as any other number. What is the probability of rolling a 1 or a 6?

(a) 1/3
(b) 1/4
(c) 1/2
(d) 2/3
(e) None of the above. The answer is ___________________________.

Questions 15 and 16 relate to the following: In a particular game, a fair die is tossed. If the number of spots showing is either four or five, you win $1. If the number of spots showing is six, you win $4. And if the number of spots showing is one, two, or three, you win nothing. You are going to play the game twice.

15. The probability that you win $4 both times is

(a) 1/6.
(b) 1/3.
(c) 1/36.
(d) 1/4.
(e) 1/12.

16. The probability that you win at least $1 both times is

(a) 1/2.
(b) 4/36.
(c) 1/36.
(d) 1/4.
(e) 3/4.

Questions 17 and 18 relate to the following: An event A will occur with probability 0.5. An event B will occur with probability 0.6. The probability that both A and B will occur is 0.1.

17. The conditional probability of A, given B

(a) is 0.5.
(b) is 0.3.
(c) is 0.2.
(d) is 1/6.
(e) cannot be determined from the information given.

18. We may conclude that

(a) events A and B are independent.
(b) events A and B are disjoint.
(c) either A or B always occurs.
(d) events A and B are complementary.
(e) none of the above is correct.

19. Experience has shown that a certain lie detector will show a positive reading (indicates a lie) 10% of the time when a person is telling the truth and 95% of the time when a person is lying. Suppose that a random sample of 5 suspects is subjected to a lie detector test regarding a recent one-person crime. Then the probability of observing no positive reading if all suspects plead innocent and are telling the truth is

(a) 0.409.
(b) 0.735.
(c) 0.00001.
(d) 0.591.
(e) 0.99999.

20. If you buy one ticket in the Provincial Lottery, then the probability that you will win a prize is 0.11. If you buy one ticket each month for five months, what is the probability that you will win at least one prize?

(a) 0.55
(b) 0.50
(c) 0.44
(d) 0.45
(e) 0.56

Part 2: Free Response

Answer completely, but be concise. Write sequentially and show all steps.

21. A box contains six red tags numbered 1 through 6 and four white tags numbered 1 through 4. One tag is drawn at random.

(a) Write the sample space for this experiment.

Calculate the following probabilities:

(b) P(red)

(c) P(even number)

(d) P(red and even)

(e) P(red or even)

(f) P(neither red nor even)

(g) P(even | red)

(h) P(red | even)

(i) P(<4 | odd)

22. Suppose that for a group of consumers, the probability of eating pretzels is 0.75 and that the probability of drinking Coke is 0.65. Further suppose that the probability of eating pretzels *and* drinking Coke is 0.55. Determine if these two events are *independent*.

23. Here is the assignment of probabilities that describes the age (in years) and the sex of a randomly selected American student.

Age	14-17	18-24	25-34	≥35
Male	0.01	0.30	0.12	0.04
Female	0.01	0.30	0.13	0.09

(a) What is the probability that the student is a female?

(b) What is the conditional probability that the student is a female, given that the student is at least 35 years old?

(c) What is the probability that the student is either a female or at least 35 years old?

24. If three dice are rolled, find the probability of getting triples (that is, 1,1,1 or 2,2,2 or 3,3,3, etc.).

25. If four cards are drawn from a standard deck of 52 playing cards and not replaced, find the probability of getting at least one heart.

26. It is believed that 75% of all apartment dwellers in a large city deadbolt their doors in addition to locking them as an added precaution against burglary.

a) Describe (in words, and in detail) how you would simulate examining the locking habits of an SRS of 20 apartment dwellers. Address the first three of the four-step model:

- correspondence
- repetition
- stopping rule
- estimate probability

b) Carry out your plan beginning at line **127** in the random digits table below. Simulate an SRS of 20 apartment dwellers. (Reminder: Show Your Work!) Then estimate the probability by reporting the proportion *p* of people in the sample who deadbolt their doors.

127	43909	99477	25330	64359	40085	16925	85117	36071
128	15689	14227	06565	14374	13352	49367	81982	87209

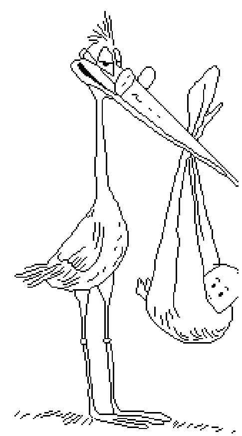
27. A couple plans to have three children. Find the probability that the children are

(a) all boys

(b) all girls

(c) exactly two boys or exactly two girls

(d) at least one child of each sex.



28. In a statistics class there are 18 juniors and 10 seniors; 6 of the seniors are females, and 12 of the juniors are males. If a student is selected at random, find the probability of selecting

(a) a junior or a female
(b) a senior or a female
(c) not a junior male

29. A recent survey asked 100 randomly selected adult Americans if they thought that women should be allowed to go into combat situations. Here are the results:

Gender	Yes	No
Male	32	18
Female	8	42

(a) Find the probability of a "Yes" answer, given that the person was a female.

(b) Find the probability that the respondent was a male, given that the response was a "No."

30. Toss two balanced coins. Let A = head on the first toss, and let B = both tosses have the same outcome. Are events A and B independent? Explain your reasoning clearly.

31. Parking for students at Central High School is very limited, and those who arrive late have to park illegally and take their chances at getting a ticket. Joey has determined that the probability that he has to park illegally and that he gets a parking ticket is 0.07. He recorded data last year and found that because of his perpetual tardiness, the probability that he will have to park illegally is 0.25. Suppose that Joey arrived late once again this morning and had to park in a no-parking zone. Can you find the probability that Joey will get a parking ticket? If so, do it. If you need additional information to find the probability, explain what is needed.

32. Two cards are dealt, one after the other, from a shuffled 52-card deck. Why is it wrong to say that the probability of getting two red cards is (1/2)(1/2) = 1/4? What is the correct probability of this event?