

Name:

Chapter 5 - Probability

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. An assignment of probability must obey which of the following?
- The probability of any event must be a number between 0 and 1, inclusive.
 - The sum of all the probabilities of all outcomes in the sample space must be exactly 1.
 - The probability of an event is the sum of the outcomes in the sample space which make up the event.
 - All of the above.
 - A and B only.
2. Students at University X must be in one of the class ranks—freshman, sophomore, junior, or senior. At University X, 35% of the students are freshmen and 30% are sophomores. If a student is selected at random, the probability that her or she is either a junior or a senior is
- 30%.
 - 35%.
 - 65%.
 - 70%.

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.

3. The probability that you win \$4 both times is
- $1/6$
 - $1/3$
 - $1/36$
 - $1/4$
 - $1/12$
4. The probability that you win money at least once in the two games is
- .75
 - .50
 - .25
 - .125
 - .1

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.

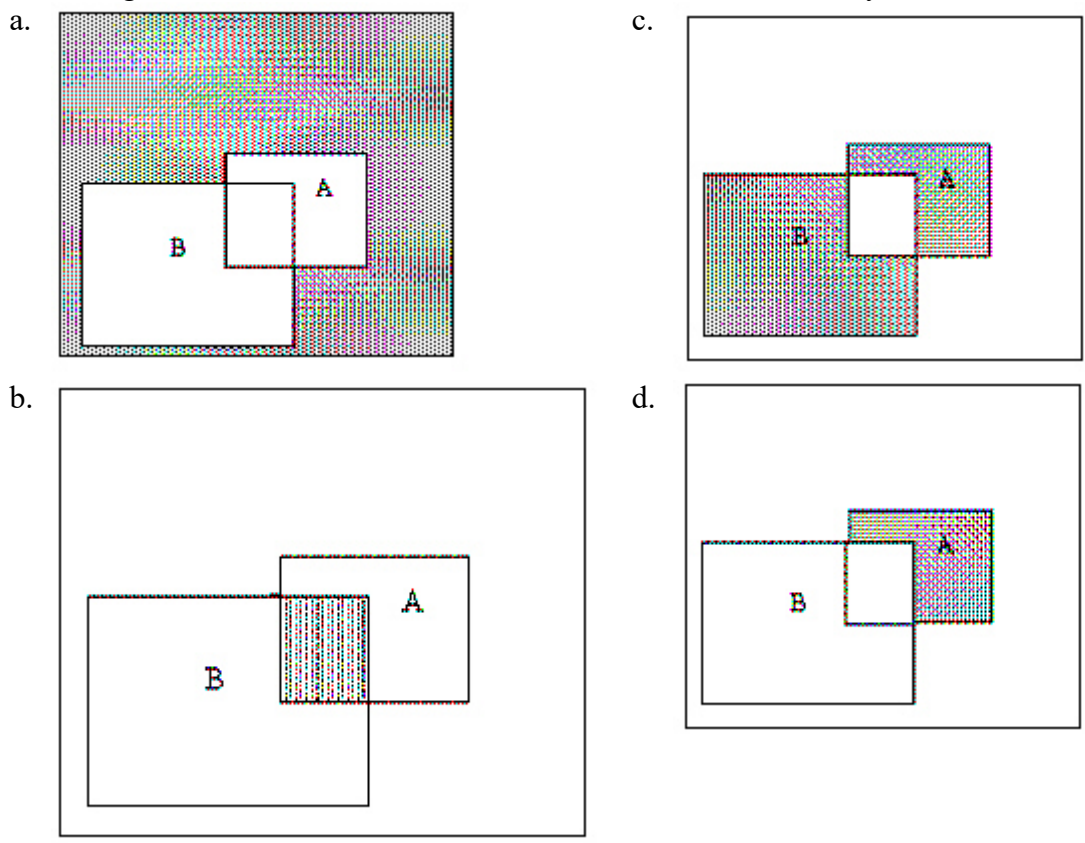
5. The conditional probability of A given B is
- 0.5.
 - 0.3.
 - 0.2.
 - $1/6$.
 - cannot be determined from the information given.
6. Experience has shown that a certain lie detector will show a positive reading (indicates a lie) 10% of the time when a person is telling the truth and 95% of the time 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. 0.590
- e. 0.99999

7. 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

8. Suppose that A and B are two independent events with $P(A) = .2$ and $P(B) = .4$. $P(A \cap B^c)$ is
- a. 0.08.
 - b. 0.12.
 - c. 0.52.
 - d. 0.60.

9. A plumbing contractor puts in bids in on two large jobs. Let the event that the contractor wins the first contract be A and the event that the contractor wins the second contract be B. Which of the Venn diagrams has shaded the event that the contractor wins exactly one of the contracts?



10. A die is loaded so that the number 6 comes up three times as often as any other number. What, then, is the probability of rolling a 6?
- a. .125
 - b. .250
 - c. .375
 - d. .500
 - e. None of the above.

AP Statistics: Chapter 5 Practice Free Response exam

1. Below is a two-way table that describes responses of 120 subjects to a survey in which they were asked, “Do you exercise for at least 30 minutes four or more times per week?” and “What kind of vehicle do you drive?”

		Car type			Total
		Sedan	SUV	Truck	
Exercise?	Yes	25	15	12	52
	No	20	24	24	68
Total		45	39	36	120

Suppose one person from this sample is randomly selected.

- What is the probability that the person selected drives an SUV?
 - What is the probability that the person selected drives either a sedan or a truck?
 - What is the probability that the person is a non-exerciser that drives a sedan?
 - What is the probability that the person is a non-exerciser or drives a sedan?
 - What is the probability that the person selected drives a truck given that they exercise?
2. There are 35 students in Ms. Ortiz’s Calculus class. One day, 24 students turned in their homework and 14 turned in test corrections. Eight of these students turned in both homework and test corrections. Suppose we randomly select a student from the class.
- Complete a Venn diagram below so that it describes the chance process involved here. Let H = the event “turned in homework” and C = the event “turned in corrections.”
 - Using your Venn diagram, determine the probability that a student did not turn in homework or their test corrections.
 - Using your Venn diagram, determine the probability that a student turned in homework given that they turned in test corrections.
3. You have been handed a bag containing four \$1 bills and two \$5 bills. You will reach in the bag (blindly) and select two bills at random.
- Sketch a complete tree diagram to represent the outcomes of this random selection.
- Use your tree diagram to answer the following:**
- What is the probability that you end up with \$6?
 - What is the probability that the two selected bills are the same dollar amount?


Name:

Score: 0 / 10 points (0%)

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 - The sum of all the probabilities of all outcomes in the sample space must be exactly 1.
 - The probability of an event is the sum of the outcomes in the sample space which make up the event.
 - All of the above.
 - A and B only.

ANSWER: D

All the statements in a through c are part of the rules of probability. Specifically, they are Rules 1, 2 and 3.

POINTS: 0 / 1


-  — 2. Students at University X must be in one of the class ranks—freshman, sophomore, junior, or senior. At University X, 35% of the students are freshmen and 30% are sophomores. If a student is selected at random, the probability that her or she is either a junior or a senior is
- 30%.
 - 35%.
 - 65%.
 - 70%.

ANSWER: B

The probability of either a Junior or Senior will be $1 - P(\text{Freshman or Sophomore}) = 1 - (.35 + .30) = 1 - .65 = .35$ or **35%**.

POINTS: 0 / 1


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.

-  — 3. The probability that you win \$4 both times is
- $1/6$
 - $1/3$
 - $1/36$
 - $1/4$
 - $1/12$

ANSWER: C

Winning \$4 both times means that you rolled 6 both times. So we need the probability of rolling a 6 two consecutive times. Since rolls of a die are independent, the probability of rolling two straight sixes is just $P(6) * P(6) = 1/6 * 1/6 = 1/36$.

POINTS: 0 / 1

-  — 4. The probability that you win money at least once in the two games is
- .75
 - .50
 - .25
 - .125

e. .1

ANSWER: A

As a general rule, the $P(\text{at least one}) = 1 - P(\text{none})$. So find the probability of winning nothing in the two plays of the game. The probability of winning nothing in ONE game is 0.5 since that happens when a 1, 2 or 3 is rolled ($3/6 = 0.5$). So the probability of this happening twice is $0.5 * 0.5 = .25$. So the probability of winning at least one game is $1 - .25 = .75$.

POINTS: 0 / 1

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.



5. The conditional probability of A given B is
- 0.5.
 - 0.3.
 - 0.2.
 - 1/6.
 - cannot be determined from the information given.

ANSWER: D

$$P(A|B) = \frac{P(A \text{ and } B)}{P(B)} = \frac{.1}{.6} = \frac{1}{6}$$

POINTS: 0 / 1



6. 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
- 0.409
 - 0.735
 - 0.00001
 - 0.590
 - 0.99999

ANSWER: D

Since the probability of a positive reading when someone is telling the truth is 0.1, the probability of a negative reading is 0.9. So the probability of 5 negative results is $(0.9)^5 = 0.59049 \approx 0.59$.

POINTS: 0 / 1



7. 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?
- 0.55
 - 0.50
 - 0.44
 - 0.45
 - 0.56

ANSWER: C

Recall again that $P(\text{at least one}) = 1 - P(\text{none})$, so find the probability that you don't win anything first. The probability of not winning is .89 ($1 - .11$). So the probability of not winning 5 games is $(.89)^5 = .558$. So the answer to the question is $1 - .558 = .442 \approx .44$.

POINTS: 0 / 1

8. Suppose that A and B are two independent events with $P(A) = .2$ and $P(B) = .4$.

$P(A \cap B^c)$ is

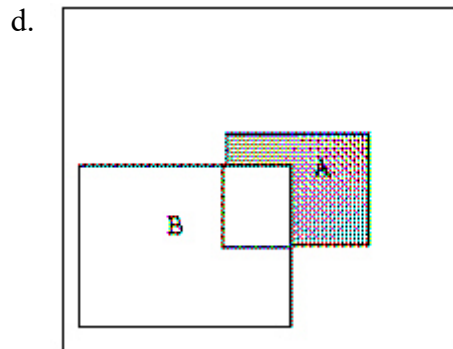
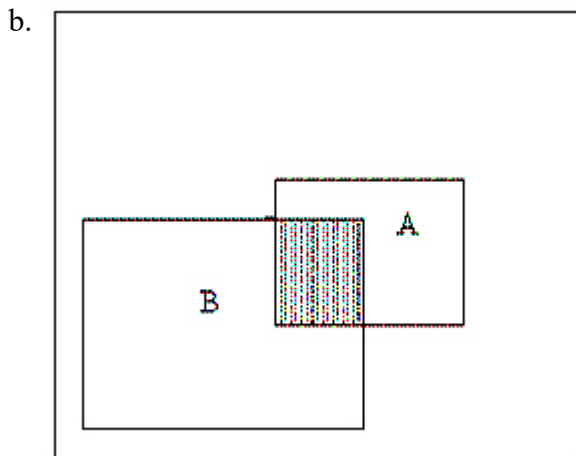
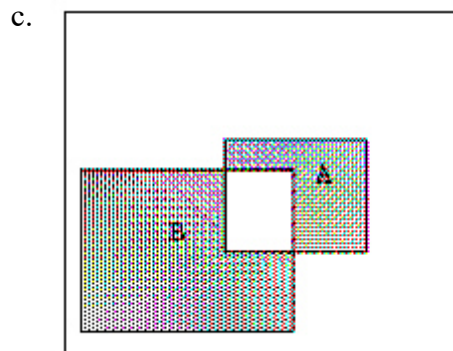
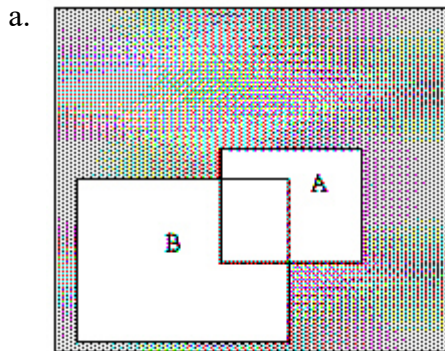
- a. 0.08.
- b. 0.12.
- c. 0.52.
- d. 0.60.

ANSWER: B

Since the events are independent, $P(A \cap B^c) = P(A) \cdot P(B^c) = (0.2) \cdot (0.6) = .12$.

POINTS: 0 / 1

9. A plumbing contractor puts in bids in on two large jobs. Let the event that the contractor wins the first contract be A and the event that the contractor wins the second contract be B. Which of the Venn diagrams has shaded the event that the contractor wins exactly one of the contracts?



ANSWER: C

Winning exactly one does means not both. Answer C shows only the non-overlapping sections shaded, so that is the answer (winning A and Not B OR winning B and not A).

POINTS: 0 / 1

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

- a. .125
- b. .250
- c. .375
- d. .500
- e. None of the above.

ANSWER: C

This is a tricky problem! Here's how to solve it:

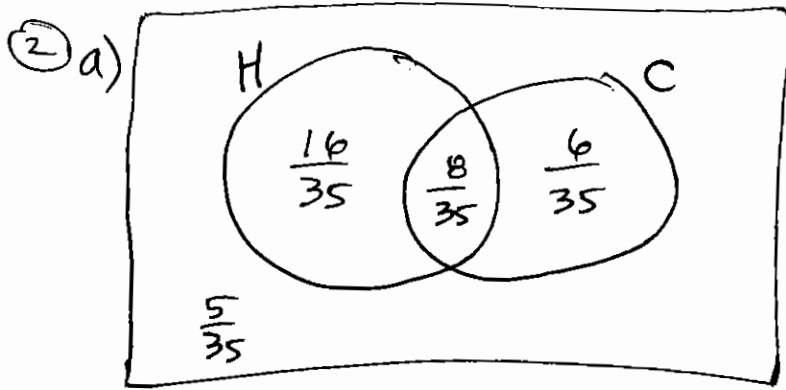
Let $x = P(1) = P(2) = P(3) = P(4) = P(5)$. Since the probability of a 6 is three times greater than the others, $P(6) = 3x$. We know that the sum of the probability sample

greater than the others, $P(6) = 3x$. We know that the sum of the probability sample space must be one, so $P(1) + P(2) + P(3) + P(4) + P(5) + P(6) = x + x + x + x + x + 3x = 8x$. So $8x = 1$ and $x = 1/8 = .125$. So the $P(6) = 3 * .125 = .375$.

POINTS: 0 / 1

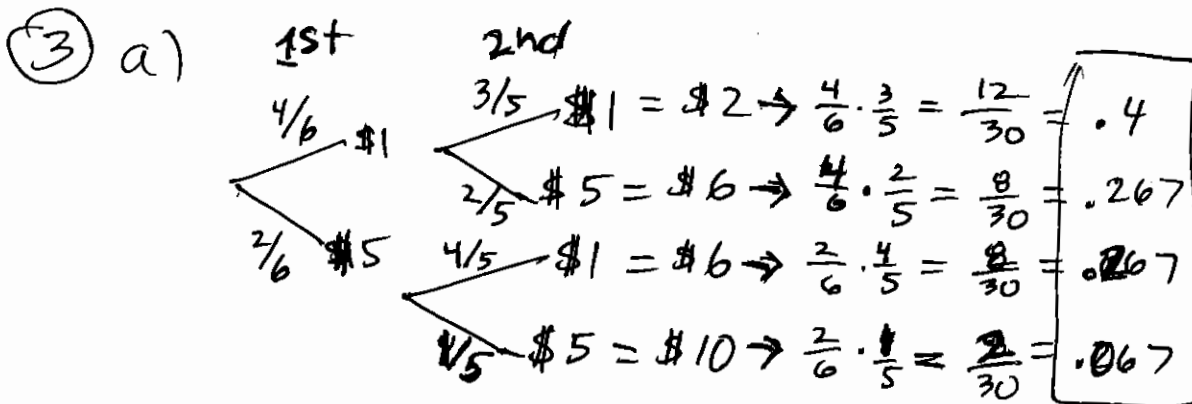
Solutions to Chap 5 Practice Test

① a) $\frac{39}{120} = .325$ b) $\frac{45+36}{120} = .675$ c) $\frac{20}{120} = .167$
 d) $\frac{25+20+24+24}{120} = .775$ e) $\frac{12}{52} = .231$



b) $\frac{5}{35} = .143$

c) $\frac{8}{14} = .571$



b) $\frac{8}{30} + \frac{8}{30} = \frac{16}{30} = \frac{8}{15} = .533$

c) $\frac{12}{30} + \frac{2}{30} = \frac{14}{30} = \frac{7}{15} = .467$