

## Homework #4 Answers

4. Pop quiz. Choice C. The quiz will be either Wednesday, Thursday, or Friday. The probability the test will be Wednesday is  $\frac{1}{3}$ , so the probability the test will not be Wednesday is  $\frac{2}{3}$ .

- 7a) No - sum does not equal 1
- b) No - sum does not equal 1
- c) Yes
- d) No - prob. cannot be negative
- e) Yes

**18. Vehicles.**

A family may have both a car and an SUV. The events are not disjoint, so the Addition Rule does not apply.

**20. Speeders.**

When cars are traveling close together, their speeds are not independent. For example, a car following directly behind another can't be going faster than the car ahead. Since the speeds are not independent, the Multiplication Rule does not apply.

**22. M&M's**

Since all of the events are disjoint (an M&M can't be two colors at once!), use the addition rule where applicable.

- a)  $P(\text{brown}) = 1 - P(\text{not brown}) = 1 - P(\text{yellow or red or orange or blue or green})$   
 $= 1 - (0.20 + 0.20 + 0.10 + 0.10 + 0.10) = 0.30$
- b)  $P(\text{yellow or orange}) = 0.20 + 0.10 = 0.30$
- c)  $P(\text{not green}) = 1 - P(\text{green}) = 1 - 0.10 = 0.90$
- d)  $P(\text{striped}) = 0$

~~Name~~ \_\_\_\_\_

Statistics: Chapter 13 Reading Guide

1. What does the text give as the "First Three Rules for Working with Probability"?
2. In the table below, fill in the 5 formal probability rules given in this chapter. Make up a short example for each one using the context of rolling a fair six-sided die.

Rule #	Write the rule	Example with rolling a 6-sided die
1	A probability is a number between 0 and 1.	$P(1) = \frac{1}{6}$
2	The set of all possible outcomes of a trial must have probability totaling 1.	$P(1 \text{ or } 2 \text{ or } 3 \text{ or } 4 \text{ or } 5 \text{ or } 6)$ $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$ $\frac{6}{6} = 1$
3	The probability that an event doesn't occur is 1 minus the probability that it does. $P(\text{not } E) = 1 - P(E)$	$P(\text{not } 6) = 1 - P(6)$ $= 1 - \frac{1}{6} = \frac{5}{6}$
4	For two <u>disjoint</u> events, the probability that one or the other occurs is the sum of the probabilities. $P(A \text{ or } B) = P(A) + P(B)$ <i>no Both</i>	$P(1 \text{ or } 2) = P(1) + P(2)$ $= \frac{1}{6} + \frac{1}{6}$ $= \frac{2}{6} = \frac{1}{3}$
5	For two independent events A and B, the probability that both A and B occur is the product of the probabilities of the two events. $P(A \text{ and } B) = P(A) * P(B)$	$P(1 \text{ and } 2) = P(1) * P(2)$ $= \frac{1}{6} * \frac{1}{6}$ $= \frac{1}{36}$

3. Which of these rules is new and/or unclear to you?

*Chapter 13 Reading Guide Possible Answers*

1. What does the text give as the “First Three Rules for Working with Probability”?

1. Make a picture.
2. Make a picture.
3. Make a picture.

2. In the table below, fill in the 5 formal probability rules given in this chapter. Make up a short example for each one using the context of rolling a fair six-sided die.

<i>Rule #</i>	<i>Write the rule</i>	<i>Example with rolling a 6-sided die</i>
<b>1</b>	A probability is a number between 0 and 1.	The probability of rolling a 5 is $\frac{1}{6}$ which is between 0 and 1.
<b>2</b>	The set of all possible outcomes of a trial must have probability totaling 1.	The set of all possible outcomes of rolling the die once have probability totaling 1. $P(1) + P(2) + P(3) + P(4) + P(5) + P(6) = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{6}{6} = 1.$
<b>3</b>	The probability that an event doesn't occur is 1 minus the probability that it does.	$P(\text{not rolling a 5}) = 1 - P(\text{rolling a 5})$ $1 - \frac{1}{6} = \frac{5}{6}.$
<b>4</b>	For two disjoint events, the probability that one or the other occurs is the sum of the probabilities.	Rolling a 3 and rolling a 5 cannot occur simultaneously on one roll of one die so they are disjoint. Therefore, $P(3 \text{ or } 5) = P(3) + P(5) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6}.$
<b>5</b>	For two independent events A and B, the probability that both A and B occur is the product of the probabilities of the two events.	Each roll of the die is independent. The probability of rolling a 3 on the first roll and a 5 on the second roll is $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}.$

3. Which of these rules is new and/or unclear to you?

**Homework#5:** Pg. 321 - 322 #23, 33, 34, 35, 37

23. **Blood** The American Red Cross says that about 44% of the U.S. population has Type O blood, 42% Type A, 10% Type B, and the rest Type AB. Someone volunteers to give blood. What is the probability that this donor
- a) has Type AB blood?
  - b) has Type A or Type B?
  - c) is not Type A?

33. **The train** To get to work, a commuter must cross train tracks. The time the train arrives varies slightly from day to day, but the commuter estimates he'll get stopped on about 15% of work days. During a certain 5-day work week, what is the probability that he
- a) gets stopped on Monday and again on Tuesday?
  - b) gets stopped for the first time on Thursday?
  - c) gets stopped every day?
  - d) gets stopped at least once during the week?

34. **Voters** Suppose that in your city 37% of the voters are registered as Democrats, 29% as Republicans, and 11% as members of other parties (Liberal, Right to Life, Green, etc.). Voters not aligned with any official party are termed “Independent.” You are conducting a poll by calling registered voters at random. In your first three calls, what is the probability you talk to
- a) all Republicans?
  - b) no Democrats?
  - c) at least one Independent?

- 35. Religion** Census reports for a city indicate that 62% of residents classify themselves as Christian, 12% as Jewish, and 16% as members of other religions (Muslims, Buddhists, etc.). The remaining residents classify themselves as nonreligious. A polling organization seeking information about public opinions wants to be sure to talk with people holding a variety of religious views, and makes random phone calls. Among the first four people they call, what is the probability they reach
- a) all Christians?
  - b) no Jews?
  - c) at least one person who is nonreligious?



37. **Pepsi** For a sales promotion, the manufacturer places winning symbols under the caps of 10% of all Pepsi bottles. You buy a six-pack. What is the probability that you win something?

#23 a) 4%  
 b) 52%  
 c) 58%

#33 a) .0225  
 b) .092

c) .0000759  
 d) .556  $\leftarrow 7.59 \times 10^{-5}$

$1 - P(0 \text{ stops})$   
 $1 - (.85)^5 =$

#34 a) .024  
 b) .25  
 c) .543

#35 a) .148  
 b) .600  
 c) .3439

#37) .469