

Name: _____

MATH 307

Spring 2023

HW 6: Due 02/27 (28)

*“The laws of probability, so true in
general, so fallacious in particular.”*

–Edward Gibbon

Problem 1. (10pt) The probabilities of several events in a finite probability space are given below:

$$P(A) = 0.45 \quad P(A \mid C) = 0.10$$

$$P(B) = 0.50 \quad P(B \cap C) = 0.25$$

$$P(C) = 0.30 \quad P(A \cap B) = 0.15$$

- (a) Find $P(A \cup B)$.
- (b) Find $P(B \mid C)$.
- (c) Find $P(A \cap C)$.
- (d) If A and C were independent, find $P(A \cap C)$.
- (e) Using (c) and (d), determine if A and C are independent.

Problem 2. (10pt) Dr. Graham's 5th grade class has created a table of the number of times a school in the district has delayed or cancelled school in the last decade based on the amount of snow they received the night before. Their results are summarized below.

	0" – 0.9"	1" – 2.9"	2.9" – 4.9"	$\geq 5"$	Total
On-Time	1200	800	350	5	2355
Delayed	26	54	875	1022	1977
Canceled	0	3	55	410	468
Total	1226	857	1280	1437	4800

- (a) What percentage of the time did schools cancel when it snowed?
- (b) What percentage of the time that it snowed did they receive 1" – 2.9"?
- (c) On days when it snowed more than 5", what percentage of schools cancelled school?
- (d) On days when schools delayed, what percentage of those days did it snow between 0" and 0.9"?

Problem 3. (10pt) Mr. Bobbert has a 4th grade class with 30 students. In this class, there are 18 students that like sports, 9 students that like video games, and 8 students that like both.

- (a) Find the probability that a randomly selected student like sports or video games.
- (b) Find the probability that a randomly selected student only likes sports.
- (c) Find the probability that a randomly selected student does not like sports nor video games.
- (d) If a student enjoys video games, find the probability that they also enjoy sports.

Problem 4. (10pt) Ms. Streikert has a 6th grade English class. She finds that there is a 75% chance that a student studies for an exam. If a student studies for an exam, there is an 90% chance that they pass the exam. If a student does not study for an exam, there is a 85% chance that they fail the exam.

- (a) Find the probability that a randomly selected student fails the exam.
- (b) Find the probability that a randomly selected student studies or passes the exam.
- (c) Find the probability that a randomly selected student both studies and fails the exam.
- (d) If a student fails the exam, find the probability that they did not study.