Name: _____
MATH 108
Fall 2023
HW 8: Due 10/17

"The consequences of an act affect the probability of its occurring again."
–B.F. Skinner

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

$$\begin{aligned} P(A) &= 0.45 & P(D) &= 0.10 \\ P(B) &= 0.20 & P(A \text{ and } C) &= 0.01 \\ P(C) &= 0.85 & P(B \text{ and } C) &= 0.10 \end{aligned}$$

(a) Assuming that A and B are independent, find $P(A \text{ or } B)$.

(b) Assuming C and D are disjoint, find $P(C \text{ or } D)$.

(c) Are B and C disjoint? Explain.

(d) Are A and C independent? Explain.

(e) Find $P(B \mid C)$.

Problem 2. (10pt) A statistician is examining tax rebates for small businesses in the area. She finds that of the 227 small businesses in the county, 109 qualified for a state tax rebate, 80 qualified for a federal tax rebate, and 38 qualified for both.

(a) Find the probability that a randomly selected local small business qualified for a state or federal tax rebate.

(b) Find the probability that a randomly selected local small business qualified for a state and federal tax rebate.

(c) Find the probability that a randomly selected local small business qualified for neither a state nor a federal tax rebate.

(d) Find the probability that a randomly selected local small business qualified for only a state tax rebate.

(e) Find the probability that a randomly selected local small business that qualified for a state tax rebate also qualified for a federal tax rebate.

Problem 3. (10pt) A large accounting class has 156 students. A chart summarizing the pass/fail/withdraw results for students, broken down by class, is given below.

	Pass	Fail	Withdraw
Freshmen	41	14	6
Sophomore	56	11	3
Junior	18	3	1
Senior	3	0	0

Given the data above, answer the following:

(a) Find the probability that a randomly selected student failed the course.

(b) Find the probability that a randomly selected student was a sophomore or withdrew from the course.

(c) Find the probability that a randomly selected student was a junior and failed the course.

(d) Find the probability that a randomly selected freshman failed the course.

(e) Are freshmen status and failing the course independent events? Explain.

Problem 4. (10pt) Administrators at a college are examining job placement for their graduates. Only 4% of their graduates are Computer Science majors. They find that 85% of their computer science majors obtain a job within 6 months of graduating. For all other majors at the college, 70% of their graduates find a job within 6 months of graduating.

(a) Find the percentage of graduates that received a job within 6 months of graduating.

(b) Find the percentage of graduates that were a computer science major and obtained a job within 6 months of graduating.

(c) Find the percentage of graduates that obtained a job within 6 months of graduating or were not a computer science major.

(d) Of the graduates that obtained a job within 6 months of graduating, what percentage were computer science majors?