Name: _____ Date: _____

PSTAT 5A: Homework 02

Summer Session B 2025, with *Annie Adams*

1. A recent survey at a cinema revealed that 80% of moviegoers purchase popcorn and 60% purchase a drink. Additionally, 62.5% of those who purchase popcorn also purchase a drink.

(a) Define events, and translate the information provided in the problem. Remember: the events you define should not be conditional.

(b) What is the probability that a randomly selected moviegoer purchases both popcorn and a drink?

(c) What is the probability that a randomly selected moviegoer purchases neither popcorn nor a drink?

2. Consider the experiment of selecting a number at random from the set of positive integers between 1 and 100, inclusive on both ends, and recording the number selected.

(a) Write down the outcome space Ω for this experiment (its okay to use .... Instead of writing every possible outcome).

(b) What is the probability that the number selected is even?

(c) What is the probability that the number selected is strictly greater than 65?

(d) What is the probability that the number selected is even, given that it is strictly greater than 65?

(e) If the number is a multiple of 3, what is the probability that it is odd?

3. A research scientist is interested in the relationship between exercise habits and mental health. To that effect, she surveyed several individuals on their exercise habits as well as their mental health; the results of her survey are displayed in the following contingency table:

	Poor	Fair	Good
Sedentary	30	25	20
Moderately Active	40	35	30
Very Active	45	50	25

A person is selected at random. Use the classical approach to probability wherever necessary.

(a) What is the probability that the selected person has a sedentary lifestyle?

(b) What is the probability that the selected person has “fair” mental health?

(c) What is the probability that the selected person has both a "moderately active" lifestyle and "good" mental health?

(d) Given the person has "good" mental health, what is the probability that they have a "very active" lifestyle?

(e) If the person has a "moderately active" lifestyle, what is the probability that they have "fair" mental health?

4. Consider events E and F with $\mathbb{P}(E) = 0.5$, $\mathbb{P}(F) = 0.7$, and $\mathbb{P}(E \cap F) = 0.35$

(a) What is $\mathbb{P}(E \cup F)$?

(b) What is $\mathbb{P}(E|F)$?

(c) What is $\mathbb{P}(F|E)$?

(d) Are **E** and **F** mutually exclusive? Why or why not?

(e) Are **E** and **F** independent? Why or why not?