



## PSTAT 5A: Homework 2

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Please note, you are responsible for completing your homework and submitting it to Gradescope. Though the Syllabus allows for the option to not submit homework, it is highly recommended.

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.
- Write down the outcome space  $\Omega$  for this experiment.
  - What is the probability that the number selected is even?
  - What is the probability that the number selected is strictly greater than 65?
  - What is the probability that the number selected is even, given that it is strictly greater than 65?
  - If the number is a multiple of three, what is the probability that it is odd?

3. A researcher 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:

Exercise_Habits	Mental_Health		
	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.

- What is the probability that the selected person has a sedentary lifestyle?
- What is the probability that the selected person has 'fair' mental health?
- What is the probability that the selected person has both a 'moderately active' lifestyle and 'good' mental health?
- Given that 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  $P(E) = 0.5$ ,  $P(F) = 0.7$ , and  $P(E \cap F) = 0.35$ .

a. What is  $P(E \cup F)$ ?

b. What is  $P(E|F)$ ?

c. What is  $P(F|E)$ ?

d. Are E and F mutually exclusive? Why or why not?

e. Are E and F independent? Why or why not?