Name: _____

MATH 108
Spring 2024
HW 8: Due 02/26

"If you really want something in this life, you have to work for it—now quiet, they're about to announce the lottery numbers!"

— Homer Simpson

Problem 1. (10pts) Define what it means for two events A, B to be disjoint—give both the mathematical and 'colloquial' definition. Give an example of disjoint events and give an example of non-disjoint events.

Problem 2. (10pts) Define what it means for two events A, B to be independent—give both the mathematical and 'colloquial' definition. Give an example of independent events and give an example of non-independent events.

Problem 3. (10pts) If A, B are events, explain what $P(A \mid B)$ means. Give an example with explicit events A, B. Explain why $P(A \text{ and } B) \leq P(A)$.

Problem 4. (10pts) The probabilities of several events in a finite probability space are given below:

$$\begin{aligned} P(A) &= 0.83 & P(D) &= 0.15 \\ P(B) &= 0.49 & P(A \text{ and } B) &= 0.24 \\ P(C) &= 0.32 & P(B \text{ and } D) &= 0.17 \end{aligned}$$

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

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

(c) Are A and B disjoint? Explain.

(d) Are B and D independent? Explain.

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