STAT 425 – HW1

Assigned on Tues Sept 20, due on Wed Sept 21

Section 1.4: Set Theory

1. Reconsider the “unfinished game” example. As we did in class, let the events \( H = \{ \text{Heather wins} \} \) and \( T = \{ \text{Tom wins} \} \). Also let \( A = \{ \text{game ends after the 7th coin toss} \} \) and \( B = \{ \text{game ends after the 8th coin toss} \} \). Use the same notation that we used in class to list all outcomes in the following events:

   a) \( B \)

   b) \( B \cap H \)

   c) \( B \cap T \)

   d) Identify all pairs of these events that are disjoint.

   e) Identify all pairs of these events for which one event is a subset of the other. (Do not bother to list each event as a subset of itself.)

2. Suppose that 5 votes for two candidates, Chad and Diane, are to be counted in random order. Chad has 3 votes and Diane has 2 votes. Consider the following events:

   \[ E = \{ \text{Chad always leads as the votes are counted} \} \]

   \[ F = \{ \text{Chad never trails as the votes are counted} \} \]

   \[ G = \{ \text{Diane leads at least once as the votes are counted} \} \]

   Let the notation \( C_i \) mean that the \( i^{th} \) vote to be counted is a Chad vote, and similarly let \( D_i \) mean that the \( i^{th} \) vote to be counted is a Diane vote.

   a) Does \( E = C_1 \cap C_2 \cap C_3 \)? Explain/justify your answer.

   b) Express the event \( F \) as the union of disjoint events, using \( C_i \) and \( D_i \) notation and using as few disjoint events in the union as possible.

   c) Express the event \( G \) as the union of disjoint events, using \( C_i \) and \( D_i \) notation and using as few disjoint events in the union as possible.