1 Math 372: Homework 01

Due Friday, Jan 24

Problem 1 (Extreme dice)**.** After losing several games in a row, Max suggests they play with a different set of dice that he found in a different part of the cave. These dice are made of diamond (D), emerald (E), and fieldstone (F), and their faces are labeled as follows:

$$\begin{aligned} D: &\quad 2, 2, 2, 5, 5, 5 \\ E: &\quad 1, 4, 4, 4, 4, 4 \\ F: &\quad 3, 3, 3, 3, 3, 6 \end{aligned}$$

(a) Suppose Max rolls dice E. What is the probability that he rolls a 4?

(b) Suppose Max rolls dice D and F together. What is the probability that he rolls a 2 with dice D and a 3 with dice F?

Problem 2. Max agrees to give Diego passage back to the seaport, but only if he can beat him in a game involving these dice. Each player will choose one of the three dice, and the winner is the player who rolls the higher number.

(a) In making a decision on which dice to use, Diego's first thought is to compute the expected value of each dice. What is the expected value of a roll of dice D? What about E and F?

Expected value of D = $\square$

Expected value of E = $\square$

Expected value of F = $\square$

(b) If Diego chooses D and Max chooses E, what is the probability that Diego wins?

(c) If Diego chooses D and Max chooses F, what is the probability that Diego wins?

(d) If Diego chooses E and Max chooses F, what is the probability that Diego wins?

Problem 3. Suppose you roll a red dice and a blue dice (both dice are have 6 sides). Let A be the event that the dice add up to at least 10. Let B be the event that the blue dice is a 2. And let C be the event that the red dice rolls an even number.

- Compute $\mathbb{P}[A]$
- Compute $\mathbb{P}[B]$
- Compute $\mathbb{P}[C]$
- Compute $\mathbb{P}[A \cup B]$
- Compute $\mathbb{P}[A \cap B^c]$

Problem 4 (Survey)**.** Why did you take this course and what are you hoping to get out of it?