Math 201-DAC-AB **Homework 1** **Due Thur Sept 7**
Fall 2023

Instructions: This homework will be done in groups. Only one team member needs to submit the homework. Don't forget to show ALL work neatly for full credit.

1. Consider a similar game to 21 that we'll call 38. In this game, the players each take turns naming and adding numbers from 1 to 4, where the winner is the player who reaches 38. What's the winning strategy? And for which player? What if we want to reach the number 39? or 40? Does the answer change? Why or why not?

2. These questions all deal with tic-tac-toe (regular or inverse). For the sake of simplicity, we assume X goes first.

   (a) In inverse tic-tac-toe, given the position below, what are the best move(s) for player 2 (if any)? Why?

X	O	X

   (b) In inverse tic-tac-toe, given the position below, what are the best move(s) for player 1 (if any)? Why?

X		O
	X	
		O

   (c) How many distinct configurations exist where X wins regular tic-tac-toe on her third move? How many distinct **games** exist where X wins on her third move (Note: these answers are different)?

   (d) How many different configurations exist where O wins regular tic-tac-toe on her third move with her three O's in the middle row? How many different games?

O	O	O

3. Alice, Bob, Cheryl, Daniel and Elliott need to line up for a photograph. However, Alice and Bob hate each other and refuse to stand next to each other. How many different ways can we arrange the photograph without upsetting Alice and Bob?