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Math 222 Project

Game 1

Who can always win this game, the 1st player or the 2nd player? If the first player can always win state the first move that he or she needs to make. If the second player can always win state the first move he or she must make in response to every way the game may be begin.

$$\begin{array}{|c|c|c|} \hline 1 & 2 & 1 \\ \hline 2 & 3 & 2 \\ \hline 1 & 2 & 1 \\ \hline \end{array} \rightarrow \begin{array}{|c|c|c|} \hline & & 1 \\ \hline & 3 & 2 \\ \hline 1 & 2 & \\ \hline \end{array} \text{ Hot} \rightarrow \begin{array}{|c|c|c|} \hline & & 1 \\ \hline & & 2 \\ \hline 1 & 2 & \\ \hline \end{array} \text{ Cold}$$

$$1 \oplus 1 \oplus 2 \oplus 2 \oplus 3 = 3 \quad 1 \oplus 1 \oplus 2 \oplus 2 = 0$$

The 1st player can always win if he flip the board at center for the first step.

If 1st player flip other than center board, 2nd player have chance to response for it and win.

Game 2

Who can always win this game, the 1st player or the 2nd player? If the first player can always win state the first move that he or she needs to make. If the second player can always win state the first move he or she must make in response to every way the game may be begin.

6	6	1st
12	10	1st
Cold	Hot (X > 0)	
0 0	(X 0) (X X)	
2 1	(2+X 1) (2 1+X) (2+X 1+X)	
5 3	(5+X 3) (3+X 5) (3+X 5+X)	
7 4	(7+X 4) (7 4+X) (7+X 4+X)	
10 6	(10+X 6) (10 6+X) (10+X 6+X)	

The 1st player can always win.

The 1st player can always take 2 counters from the 2nd row, move from Hot position to Cold position. So the 1st can always win.

