Logic Programming Banquet Talk

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\* Borderless TicTacToe

Two people play a version of tictactoe on

an infinite checkerboard. In this version the first player (blue) wins

by getting four blues in a row (vertically,

horizontally, or diagonally). The second player (red) wins by getting

four reds in a row or preventing blue from winning for at least 7 turns

where a turn consists of both blue and red moving.

Can either player force a win?

Solution:

The first player can force a win in 5 turns.

Blue moves. No matter where red moves, blue in the second move can

have two in a row.

. . . . . . .

. . B . . . .

. . R B . . .

. . . . . . .

. . . . . . .

. . . . . . .

. . . . . . .

Now red must respond to prevent blue from having three in a row that is

open on both ends. So R blocks, giving us something like

. . . . . . .

. . . . . . .

. R . . . . .

. . B . . . .

. . R B . . .

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Consider 16 cards consisting of the ace through 8 of hearts

and the ace through 8 of spades.

You are allowed to arrange the cards as you wish.

Your adversary comes in and gives a number between 1 and 12.

You deal that many cards from the top of the deck and put

the last card face up.

Then deal that many cards (ace is consider 1) and put the last card

face up.

You continue until the number revealed is more than the remaining cards

in which case your adversary wins or the last deal ends with the final

card of the 16 and it's an ace in which case you win.

1. Can you arrange the cards to be sure to win?
2. Upstart: Suppose the opponent gets to arrange all cards >= k. You are allowed to insert the remaining cards anywhere you like. Can you still win. What is the minimum k?

Royal Logic

In the game of Bluffhead, one shuffles all 13 spades of a deck, each person

takes a card and holds it to his or her forehead without

looking at it.

So each player sees all cards except his or her own. The best card wins. Ace is high, so ties are impossible.

In this puzzle, three logicians play this game.

Your job is to infer as much as possible from what the players say.

On each turn a player will say the most informative possible

phrase of the following:

"I win. (I have a higher card than anyone else.)"

"I lose. (Someone else has a higher card than I have.)"

"I don't know."

A says "I don't know", B says "I lose", C says "I win".

Solution: If A saw an ace or a 2 and 3 then A would know.

B knows this and sees that C has a king, so B doesn't have

an ace.

C must have the king, because if A had the king then C would

have said "I lose".

Second problem:

A says "I don't know", B says "I don't know", C says "I don't know"

then

A says "I don't know", B says "I don't know", C says "I don't know"

A says "I lose". B says "I lose". C says "I win".

Solution: A cannot see an ace. B cannot see an ace or a king. C cannot

see an ace, king or queen.

A cannot see an ace, king, queen or jack.

B cannot see an ace, king, queen, jack, or 10.

C cannot see an ace, king, queen, jack, 10, or 9.

A must therefore see an 8. B also sees an 8.

C must have the 8.