CIS 510 Assignment 2

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Problem 1
Problem 2

Consider the "cross-out" game. In this game one writes down "1,2,3". Player 1 can cross out a single number or any 2 adjacent number (12,23). Player 2 then gets to make the same type of action. The winner is the one who crosses out the last number.

Part 1.1)

Part 1.2)

This is a solved game. If it is an odd sized game then player 1 can always win, otherwise player 2 can always win. This is because if the size is odd then player 1 can place a binary partition and split the game into any two sub games. Player 2 will then be the first player on one sub game and player 1 will be the second player in the second sub game. If the second player wins any even game, then we can see that player 1 will always win this sub game (because it is even and they are the second player for an even sized game).

Part 2.1)

Realization Plan Player 1

$$r_1(\oslash) = r_1(L) + r_1(R)$$
$$r_1(L) = r_1(Ll) + r_1(Lr)$$
$$r_1(R) = r_1(Rl) + r_1(Rl)$$
$$r_1(Ll) = r_1(LlU) + r_1(LlD)$$
$$r_1(Lr) = r_1(LrU) + r_1(LrD)$$
$$r_1(Rl) = r_1(RlU) + r_1(RlD)$$
$$r_1(Rr) = r_1(RrU) + r_1(RrD)$$
$$r_1(\oslash), r_1(L), r_1(R), r_1(Ll), r_1(Lr), r_1(Rl), r_1(Rr) \geq 0$$

Realization Plan Player 2

$$r_2(\oslash) = r_2(A) + r_2(B)$$
$$r_2(A) = r_2(AC) + r_2(AD)$$
$$r_2(B) = r_2(BC) + r_2(BD)$$