Mathematics 121 – Game Theory

Homework Assignment No. 1

1. Dominoes can be placed on an $m \times n$ board so as to cover two squares exactly. Two players alternate in doing this. The first to be unable to place a domino is the loser. Draw the game tree for the case that $m = 2$ and $n=3$.
2. Apply Zermelo's algorithm to the 2×3 version of the previous game. Find the value of the game and determine a winning strategy for one of the players.
3. Who has a winning strategy in the domino-placing game when
   a. m and n are even
   b. m is even and n is odd.
   c. $m = n = 3$.

   Justify your answers.
4. Draw the trees given by the following expressions:
   a. $t = [a \oplus b \oplus c] \oplus [[[d] \oplus e] \oplus f]$
   b. $t = t \oplus t$
5. Describe the trees given by the two equations
$$t = t \oplus s$$
$$s = t \oplus a$$
6. Find the strategic form of the game given by the following game tree: