GAME THEORY — PROBLEM SET 3

Problem 1

We are playing a game of Nim (with the normal play convention) and my last move resulted in a position with five piles of sizes 26, 19, 10, 9, 7. Do you have a winning move from this position? If so, what is the maximum number of sticks you can remove in a winning move?

Problem 2

Let $G = \{\{\{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}\}$ be an impartial game as represented in the lecture notes.

(a) How many positions does G have?
(b) Compute the Grundy value $g(G)$.
(c) Who will win the game?

Problem 3

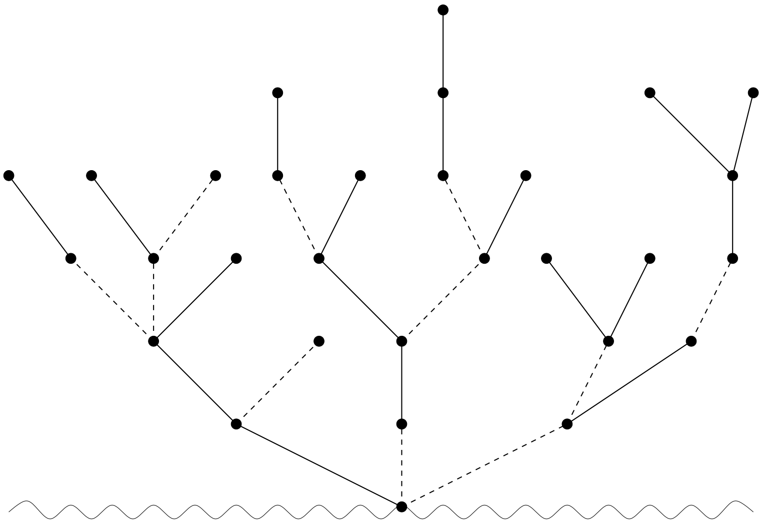
Show that the assumption that the game is short is necessary in the translation theorem.

Problem 4

Show that the game $\{0|*\}$ is positive but less than any positive number!

Problem 5

Compute the value of the following Blue-Red Hackenbush position. Who will win the game?



Problem 6

Let $G = \{\, \{7|5\}, \{10 \,||\, 5|3\} \mid \{1|0\} - \{7|0\} \,\}$.

(a) Draw the thermograph of G.
(b) What is the temperature of G?
(c) What is the mean value of G?
(d) Who will win G?
(e) Who will win the game $7G - 20$?

Problem 7

Write the following short games on canonical form:

(a) $*2$,
(b) $\{\, \{*|0\},\, 0 \,||\, \{*|0\} \,|*\, \}$.

Problem 8

Determine the value of $\{\, \frac{1}{8} \mid \frac{5}{8} \,\} + \{\, -\frac{91}{64} \mid -\frac{41}{32} \,\}$.