

Math 387

Homework 8

Due Friday, November 6

Practice exercises from the book

8.8, 8.9, 8.11

Problems

1. Show that any PSPACE-hard language is also NP-hard. (Remember that "NP-hard" requires the same thing as NP-completeness, except that the language does not have to be in NP. PSPACE-hard is defined similarly.)
2. The game Gomoku is played by two players on an $n \times n$ board. The players alternate placing pieces, with one placing red and the other placing blue. (The pieces must be placed on open spaces.) The winner is the first player to achieve a line of 5 consecutive markers (in a row, column, or diagonal). A *position* consists of a description of what stones are on the board and whose turn it is. Let *GOMOKU* be the set of positions from which red can force a win. Show that *GOMOKU* \in PSPACE.
3. Show that PSPACE is closed under the star operation.