University of Konstanz
Department of Computer & Information Science
PD Dr. Sven Kosub

Assignment 4

Ausgabe: 12 Jan 2011 **Abgabe:** 18 Jan 2011

Problem 1: Functional Equivalence — 10 Points

Let $G = (X, E)$ be an arbitrary undirected graph. Show that there exists a family L of boolean local transition functions with interdependence structure E such that

$$\|\{\ \mathbf{F}_L[\pi] \mid \pi \in S_X\ \}\| = \|\mathsf{Acyc}(G)\|,$$

i.e., the number of different phase spaces of the local state dynamics (L, π) for permutations π is exactly the number of acyclic orientations of G.

Problem 2: Chromatic Polynomial — 10 Points

(a) Determine the chromatic polynomial $P_{\mathsf{Path}_n}(x)$ of paths Path_n withs n vertices.

(b) Determine the chromatic polynomial $P_{\mathsf{Circ}_n}(x)$ of circuits Circ_n with n vertices.

Hint: Use induction.

Problem 3: Chromatic Polynomial — 10 Points

Show that the chromatic polynomial $P_G(x)$ of an undirected graph G having n vertices and m edges is a polynomial of degree n such that the coefficient of x^n is 1 and the coefficient of x^{n-1} is $-m$.

Hint: Use induction.