Theory of Computation

Homework 5

Due: 2010/01/05

Problem 1. Let A, B be finite nonempty sets, $f : A \times B \rightarrow \{0, 1\}$ and $\sum_{y \in B} f(x, y) < |B|/|A|$ for all $x \in A$. Prove the existence of a $y^* \in B$ with $\sum_{x \in A} f(x, y^*) = 0$. You may want to use the fact

$$\sum_{x \in A} \sum_{y \in B} f(x, y) = \sum_{y \in B} \sum_{x \in A} f(x, y).$$

Problem 2. Does IP contain all languages that have uniformly polynomial circuits?