

# Theory of Computation

## Homework 5

Due: 2013/12/24

**Problem 1** Prove or disprove the claim that all languages which have polynomial circuit are in PSPACE.

**Problem 2** Let  $X$  be a random variable with mean  $\mu_X$  and standard deviation  $\sigma_X$ . Recall that  $\sigma_X^2 = \mathbf{E}(X - \mu_X)^2$ . Show that for any  $t \in \mathbb{R}^+$ ,

$$\Pr[X - \mu_X \geq t\sigma_X] \leq \frac{1}{1 + t^2}.$$