Assignment 1
due on Wednesday, April 18, 2018

Name:

Exercise 1 (10 points)**.**
For every fixed field $\mathbb{F}$, show that every nonzero univariate polynomial in $\mathbb{F}[x]$ of degree n can have at most n zeros.

Exercise 2 (10 points)**.**
Fix the field $\mathbb{F} = \mathbb{F}_2$. For a multivariate polynomial h, the *arithmetic complexity* $L(h)$ is the size (number of addition and multiplication gates) of the smallest arithmetic circuit computing h.

Show that there exists $m \in \mathbb{N}$ and two multivariate polynomials h and h', both on m variables $x_1, \ldots, x_m$, such that

- $\deg(h) = \deg(h')$, and
- $h(x_1, \ldots, x_m) = h'(x_1, \ldots, x_m)$ for all $x_1, \ldots, x_m \in \mathbb{F}$, and
- $L(h) < L(h')$.