Homework 4 for Math 140C - Spring 2018

- (I) Ch 9, problems 26, 27, 28, 29
- (II) Consider the function $f : \mathbb{R}^3 \to \mathbb{R}^2$ given by $f : (x, y, z) \mapsto ((x + z)^2 - y, -x^2 + y - z)$.
  (a) Prove that f is a C^1 mapping of $\mathbb{R}^3$ into $\mathbb{R}^2$.
  (b) Prove that there are open sets $U \subset \mathbb{R}^3$ and $W \subset \mathbb{R}$ with $(1, 1, 0) \in U$ and $1 \in W$ and a C^1 function $g : W \to \mathbb{R}^2$ with $g(1) = (1, 0)$ and $f(x, g(x)) = (0, 0)$ for all $x \in W$.
  (c) Find the partial derivatives $\frac{\partial g_1}{\partial x}|_{x=1}$ and $\frac{\partial g_2}{\partial x}|_{x=1}$.