ADVANCED CALCULUS, Math 127 B
Homework 1 Due Friday January 16

1. Decide whether R with the following functions as proposed metrics make up a real metric space: (a) $d(x,y) = |x^2 - y^2|$ (b) $d(x,y) = \frac{|x-y|}{1+|x-y|}$.
2. Let Q be the set of rational numbers with the usual distance function (e.g $d(x,y) = |x-y|$). Is this a metric space? If yes, is the Heine-Borel theorem still true for this? Prove or disprove.
3. Let $F : R^k \to R$ be a continuous function. Let $Z(f) = \{p \in R^k | f(p) = 0\}$. Prove $Z(f)$ is a closed set.
4. Exercise 21.9
5. Exercise 21.10
6. Exercise 22.1
7. Exercise 22.6