Math 411 **Homework #3** **9/29/2008**

Due at the beginning of class, Thursday, October 9, 2008

These problems finish up our consideration of *basic topology*. On to **analysis!**
I decided that I couldn't push you folks through some of the intricate problems such as 23 through 26, which are more part of a topology course like Math 441. I give you one problem which might be useful to know, and five more textbook problems.

(10 points) Suppose X is a set with two metrics, d and D. Suppose that the following logical statements are true (in what follows, $N_r^d(x)$ and $N_r^D(x)$ are, respectively, the open balls of radius $r > 0$ around $x \in X$ in the the d, respectively, D metric):

If $x \in X$ and $t > 0$, then there is $s > 0$ so that $N_s^d(x) \subset N_t^D(x)$.
If $x \in X$ and $t > 0$, then there is $s > 0$ so that $N_s^D(x) \subset N_t^d(x)$.

Prove that a subset of X is open using D if and only if it is open using d.
Comment This can be done with great economy if you think a bit.

Textbook problems Chapter 2: 16, 17, 20, 22, 24, and 29. All are worth 10 points.