Math 375 Analysis Homework Week 4 2008-09 Tinsley

Instructions: The same rules apply with one additional designation for exercises. A double asterisk ** means the problem is for extra credit. The work must be entirely your own with only your instructor, class notes, and/or class text for reference. These are due by 1:00 PM on the last day of the block.

F3:
Reading: 6.4 (p. 101 – 103), 7.5 (p. 132 - 33); 7.6 (p. 134 - 35)
Exercises: Example 6.4.1 (verify the claims), Example 6.4.2&, Exercise 6.3.3&, 6.4.4, 6.4.9*, Extra 14*

Extra 14: We discussed in class three metrics for the plane: the straight line metric, the taxi cab metric, and the sup metric. Prove that each pair of these metrics is equivalent.

Here is a list of the * problems due on M4: 6.2.5*, Extra 12*, 6.4.9*, Extra 14*

M4:
Reading: Finish 7.6; 7.7(up to Definition 7.6); 7.8 (thru Theorem 8.3)
Exercises: 7.6.2&, 7.7.1&, 7.7.2&

T4:
Reading: 7.7 (up thru Theorem 7.7.10), 7.9 (up to Definition 7.9.10)
Exercises: 7.6.3#, 7.6.4#, 7.6.6#, 7.7.4#, 7.8.1#, 7.8.2#, 7.9.1#, 7.9.2#

Some interesting questions:

1. Suppose f is continuous function on *(0,1)*. Must f be differentiable at some point in *(0,1)*?

2. Let $S = \{\sin(n) \mid n \text{ an integer}\}$. Find $\sup S$.

3. A subset E of $\bullet^n$ as a metric space is called *compact* if E is closed and bounded. Let $\{U_\alpha \mid \alpha \in A\}$ be an open cover of E. Then there exists a $\delta > 0$ such that if A is any subset of E of diameter less than or equal to δ , then $A \subset U_\alpha$ for some $\alpha \in E$. (Hint: If you want to start working on this one, then assume *n=1* so that you are in the real numbers. You already know what a bounded set is. A subset of the real numbers is open if it is the union of open intervals. A subset of real numbers is closed if its complement is open.)