Math 101!
October 23, 2001

Announcements:

On last week's assignment, problem #14 just for the case of n=5 should be from §W8.3 rather than §W9.5 as originally printed. If you have ideas for fixing or improving the notes or any other handouts, please share them--preferably in a post to the discussion section of the website. Everyone will benefit and some of us will give extra credit.

Reading:

Keep working on Chapter Three of the Notes (N3) as posted on the website.
Start reading Chapter Four of the Notes (N4) as also posted on the website.

Problem Set:

A. In the Notes, §N3.3: #2, #3, and #5.
B. In the Notes, §N3.4: #2, #4, and #5.
C. In the Notes, §N3.5: #1. (Try stating and checking some generalizations of these.)
D. In Wolf, §W3.3: #8. (Proof not needed, but what is the rule for such situations?)

Activities: (Talk about these questions in section or on the website's discussion section.)

A. Work on the challenge problem §N3.4: #6.

B. Keep passing around and playing with the program Tarski's World on that CD.

C. Show that you get a metric on n-dimensional Euclidean space by declaring that

$$d(x, y) = \max \{ | x_i - y_i | \text{ such that } 1 \leq i \leq n \}.$$

What does a ball look like with respect to this metric? Prove that the closure operator determined by this metric is the same as the one we would get by starting with the Euclidean metric. Can you find a metric whose closure operator does not come out to be the same as the Euclidean one?

D. Read and contribute to the postings in the discussion section of the website about visualizing higher dimensions. Besides the links mentioned there to games and graphics, a good book about all this is: Tom Banchoff, *Beyond the Third Dimension: geometry, computer graphics, and higher dimensions,* Scientific American Library: Distributed by W.H. Freeman, New York (1990).