R. Bruner
Math 5520, Winter 2009, Homework 1
12 January 2009
(due 16 January 2009)

1. Find a continuous function with continuos inverse from the open interval $(-1, 1)$ to the real line $\mathbf{R}^1$. Give formulas for both the function and its inverse.

2. Find a continuous function with continuous inverse from the standard 2-disk D^2 to the square $[-1, 1] \times [-1, 1]$. Hint, it is sufficient to do this for the quarter of a circle which lies within 45° of the positive x-axis, and then repeat it in each of the other 3 quadrants.

3. Complete the classification of regular polyhedra begun in class (and in section 1 of the text), as follows. For each possible value of

   - $a =$ number of edges per face, and
   - $b =$ number of edges per vertex,

   compute V, E, F to satisfy Euler's formula $V - E + F = 2$ and identify the corresponding polyhedron from Figure 1.9 or state that no such polyhedron exists.

	$a = 3$	$a = 4$	$a = 5$	$a = 6$
$b = 3$	$E = 6$ $V = F = 4$ tetrahedron			Impossible
$b = 4$				
$b = 5$				
$b = 6$				

4. Problem 10 on page 11. Can you see a geometric explanation of this duality?

5. Compute the Euler characteristics of the complexes in Figure 13 on page 4.