Math 301 Homework
Donnay, Fall 2009

Due Wednesday, Sept 9th at the start of class.

S1. Consider the statement: If $n^2$ is even then $n$ is even.
   a. Give the converse of this statement.
   b. Is the converse true or false? If true, prove it. If false, give a counter-example.

S2. For each of the following, explain your answer (unless the result is "obvious").
   a. Make up a statement of the form: "If A then B" that is true.
   b. Make up a statement of the form: "If A then B" that is false.
   c. Make up a statement of the form: "If A then B" that is true but its converse is false.
   d. Make up a statement of the form: "If A then B" that is true and whose converse is true. Then rewrite the statement in the form "A if and only if B".

S3. Find the fixed point(s) for the iteration/dynamical system given by $x_{n+1} = f(x_n)$ with $f(x) = 2x(1 - x)$. Recall that a fixed point is a solution of the equation $f(x) = x$. How many fixed points are there?

Chapter 1 (Morgan): # 4, 6 (Hint: Try proof by contradiction.)

Due Friday, Sept 11th at the start of class.

S1. Consider the statement: If $n^2$ is even then $n$ is even.
   a. Give the contrapositive of this statement.
   b. Prove that the contrapositive is true (which proves that the original statement is true).

S2. (Group Problem: submit one answer for the whole group. Each person will sign the submission to indicate they contributed to the finished product.) A fixed point is said to be attracting if points that start near the fixed point approach the fixed point. A fixed point is repelling if points that start near the fixed point move away from the fixed point. For the fixed point(s) you found for Wednesday’s assignment S3, determine if they are attracting or repelling. Do this numerically: take several initial points near the fixed point, and determine if the iterates approaches or moves away from the fixed point. Make a table of your values where you give $x_0$, $x_{10}$ and state what happens to the iterates.

Chapter 1 (Morgan): # 3, 5ab, 8,