CSCI/ENGR 8940 Computational Intellignece

Assignment Number 3: Due Monday 3/31/2003 **(in class)**

1. [**100 points**] Consider the following **continuous** variable optimization problem:

   $minimize \quad f(x,y) = (|x| + |y|) \cdot (1 + |sin(|x| \cdot \pi)| + |cos(|y| \cdot \pi)|)$

   $subject \quad to:$

   $-60 \leq x \leq 40$

   $-30 \leq y \leq 70$

   (a) Use a Genetic Algorithm to find the optimum. Your GA should use no more than 2000 fitness function evaluations (NOT 2000 generations!) every run. Run the GA 10 times (with different random initial populations) and report the best point found in each time. You may download and use an existing GA or implement your own. A large collection of GA packages can be downloaded from http://www.aic.nrl.navy.mil/galist/src/.

   (b) Repeat the above experiment after you change the function to:
   $f(x,y) = (|x| + |y|) \cdot (1 + |sin(3 \cdot |x| \cdot \pi)| + |cos(3 \cdot |y| \cdot \pi)|)$
   This increases the number of local optima approximately 10 times. You should still use no more than 2000 evaluations in each optimization run.

   (c) Repeat the two experiments above but this time you should maximize instead of minimizing.

   (d) Discuss the results comparing the GA's performance before and after the increase in the number of local optima in both minimization and maximization. How much did the perfomance suffer due to the increase?

You should try to experiment with your GA to get good results. In the minimization case, the global minimum is Zero.