Soft Computing Homework 4: Genetic Algorithms (25 points)
Due: Tuesday October 2nd

Part 1

Download go_ga.m, blackbg.m, evalpopu.m, evaleach.m, bit2num.m, peaksfcn.m, nextpopu.m from the books web site. Experiment with different parameter settings; population sizes (10, 100), crossover rates (10%, 80%), mutation rates (0.01%, 5% per bit), and generations (10, 500).
To make the code run under matlab version 6 (you can check which version you have by typing "version" at the matlab prompt), change the following lines in the peaksfcn.m by adding the red statement "matlabv==6":

```
if matlabv==4,
      property='linestyle';
elseif matlabv==5 | matlabv==6,
      property='marker';
else
      error('Unknown MATLAB version!');
end
```

Part 2

Modify go_ga.m to create a Genetic Algorithm to solve the minimum of the banana function

$f(x) = 100*(y-x)^2 + (1-x)^2$

in the range $-2<x<2$ and $-1<y<3$.

Note: you do not need to plot the contours as is done in the go_ga for the peaks function.

Create a binary chromosome that represents all possible x and y values to 4 digits after the decimal point.

Program the genetic algorithm as follows

1) Create initial population
2) Run fitness function on the population
3) Elitism: Top 2 items from population move to next generation
4) Select new items for remainder of next generation (determine the probability of selecting an item from the previous generation, use a crossover rate and a mutation rate of your choosing)
5) If not maximum number of generations then Go to step 2

What to hand in:

Part 1

Describe what happened when you changed the parameter settings. Did it always act the same with the same settings? (4 points)

Part 2

Describe the chromosome you used to represent the parameters to the banana function (how many bits does it have and what is their meaning). (3 points)
What did you use for the population size and number of generations, and why? (3 points)
What did you use for crossover and mutation rates, and why? (3 points)
What is the minimum point? (2 points)
For one run of your GA print out the following
1) the x, y, and fitness of the best member of each generation (2 points)
2) the entire population after generations 5 and 10. (2 points)
3) a plot with the fitness of the best, average, and worst item for each generation. (2 points)
Your code for the banana GA (emailed to us). (4 points)