INF3490 exercises - week 2 2013

Problem 1

A common variant of evolution strategies used for (local) search is the $(1+4)$ ES. How would this differ from the $(1+1)$ ES in how the search space is explored? How does this, and $(1+\lambda)$ in general, compare to hill climbing and greedy search?

Problem 2

What effect does an adaptive search strategy have on optimization performance?

Problem 3

How would it affect the search if the strategy parameters were mutated after the solution parameters instead of before?

Problem 4

Ignoring mutation, and starting with the population $\{1, 2, 3, 4\}$, run 3 generations of a $(4+8)$ ES maximizing $f(x) = x$, and observe what the end population looks like (use intermediary recombination).

Problem 5

If an (4, 8) ES had been used in Problem 4, what would the probability of the optimal solution ($x = 4$) surviving the first generation have been?

Problem 6

Repeat Problem 4 with an EP with $q = 2$. How do the two algorithms compare?

Random numbers

Here are some "random" numbers from 1 to 8 you can use to do Problem 4 and 6. To get a random number between 1 and 4 subtract 4 if above 4 (so 5 becomes 1 and so on):

1 4 6 8 8 6 3 5 4 7 6 3 4 3 6 2 4 8 1 4
5 4 4 4 2 4 6 4 8 2 2 7 5 6 7 5 6 3 1 5
5 3 8 1 3 6 5 6 6 1 7 2 5 6 8 2 5 5 3 3
2 1 6 7 5 4 2 8 3 4 6 4 3 6 8 5 4 2 3 7
1 4 2 7 2 5 6 1 1 5 1 4 8 8 5 7 5 1 3 2