Assignment – Artificial Intelligence(COMP3008L)

Graph Partitioning Assignment

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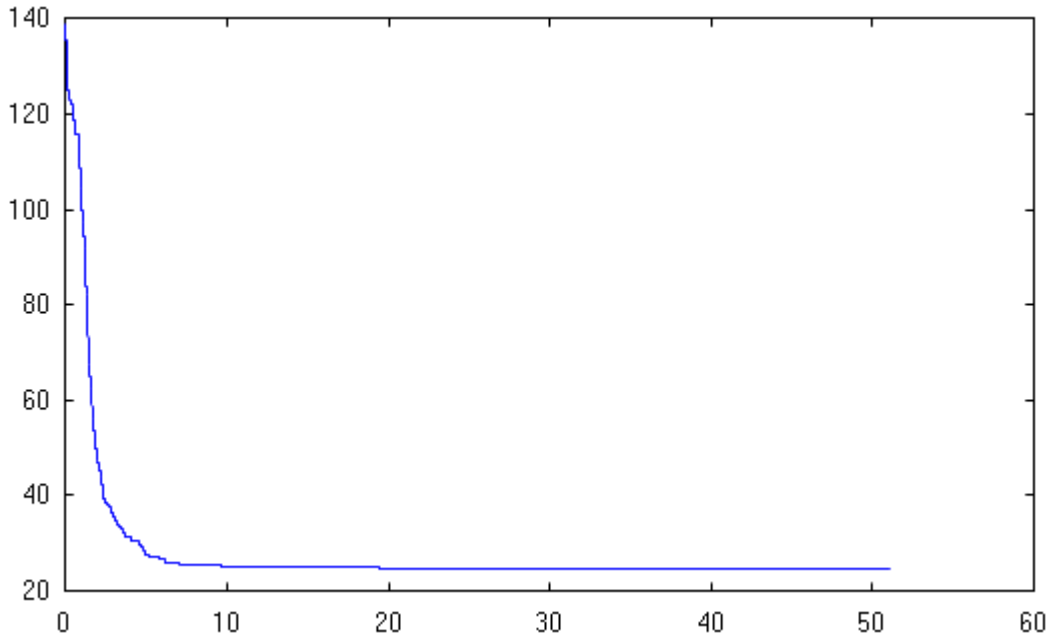
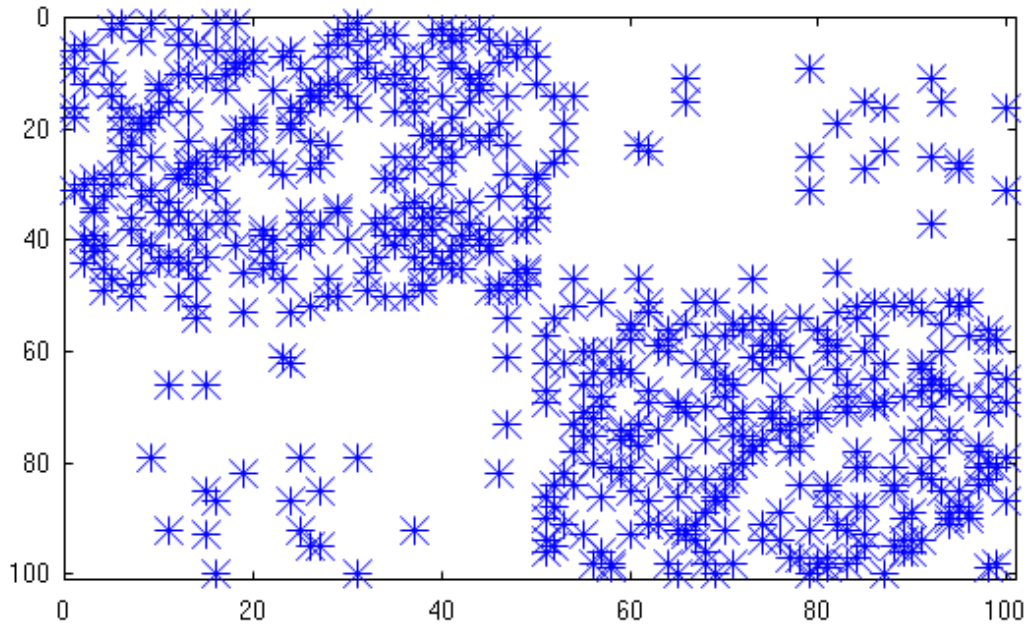
Effect of α

1. Is there an α value that you would recommend as clearly the best for this problem?

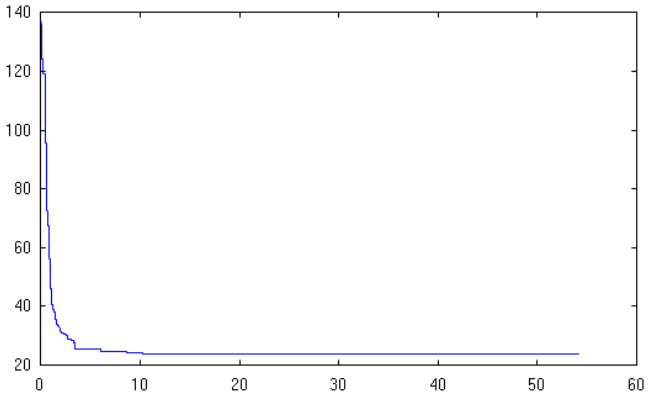
   Recommended Alpha Value :- 0.89
   Following are the results I got according to α value.



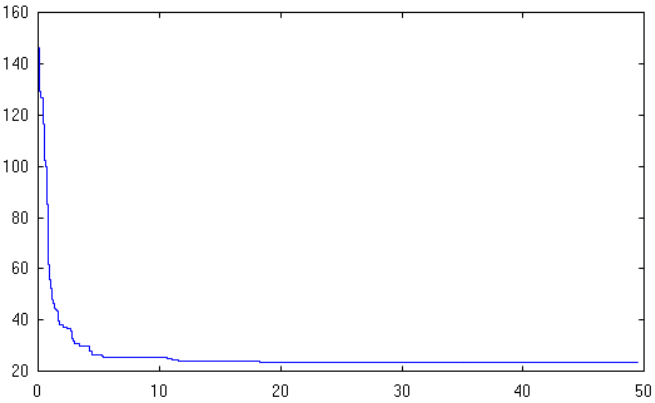


2. Is the convergence profile different for different values of α?

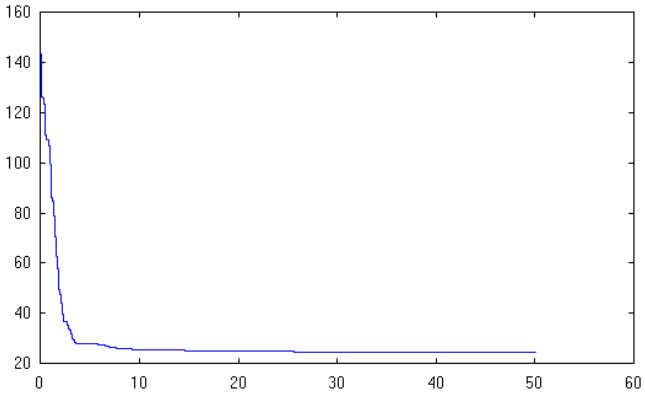
   Yes.



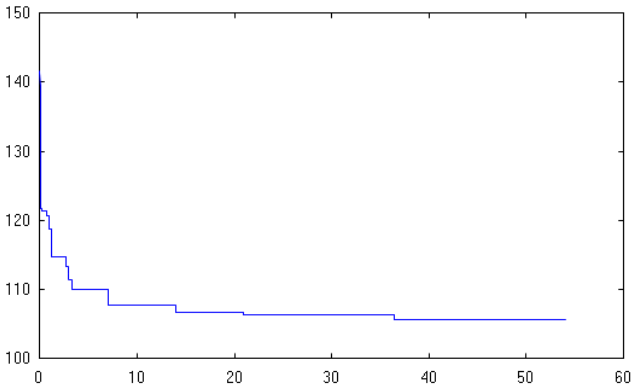
Alpha Value :- 0.6



Alpha Value :- 0.7



Alpha Value :- 0.9



Alpha Value :- 1.0

3. What happens when alpha is small e.g. alpha < 0.5?

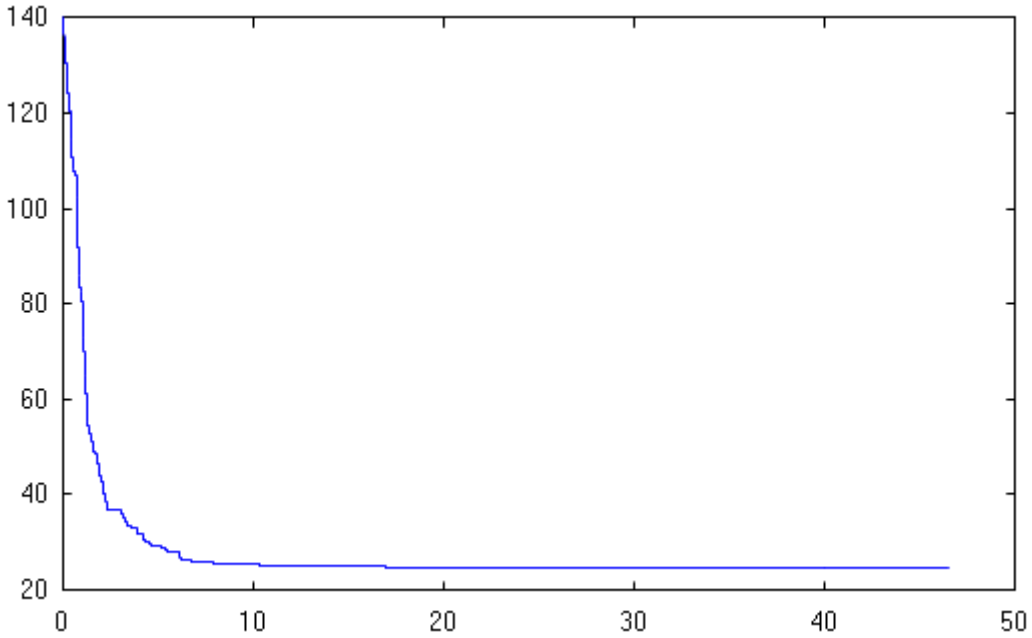
Octave gives an error.

Error: - “Division by Zero.”

4. What happens when alpha is large e.g. alpha < 0.5?

Population, density and the smoothness of the graph getting low. Curves are not accurate than alpha =0.9.

Effect of MarkovChainLength



1.Is there a best proportion for the Markov Chain length, taking into account that we are interested in the time as well as the quality of the solution.

Yes. 0.4 is the best proportion.

Effect of N

N depends on the speed and memory of the computer. When N is getting larger the sped of the computer gets low.

200, 700, 1000, 5000 and 100000 are values which we picked.

N = 200
Sim Ann = 44.9 seconds
Cut = 289
spectralCut = 65

N = 700
Sim Ann = 56.1 seconds
Cut = 351
spectralCut = 35

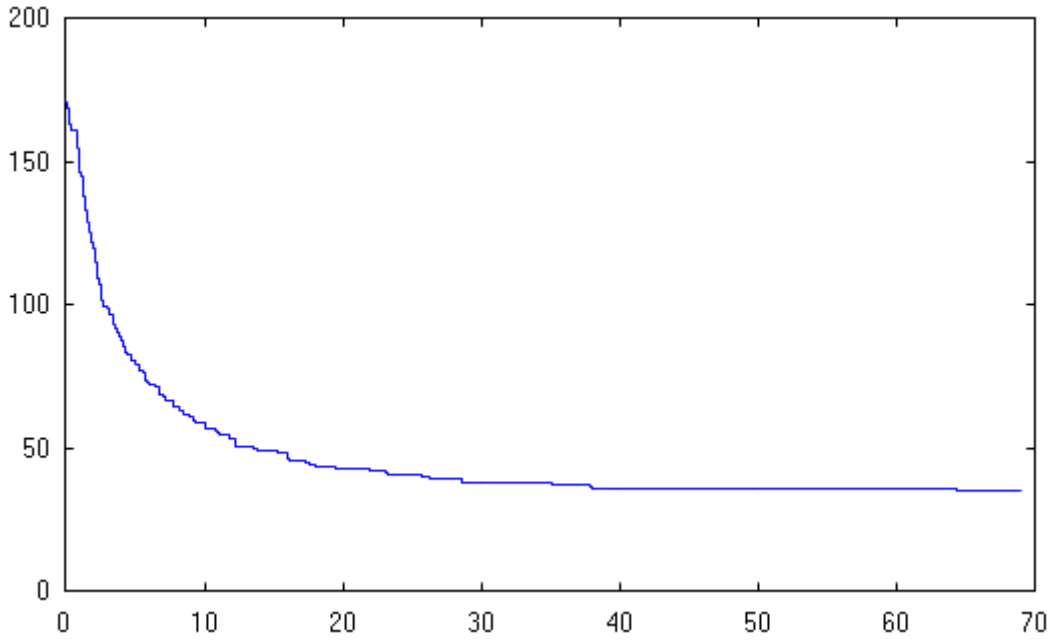
N = 1000
Sim Ann = 62.6 seconds
Cut = 1275
spectralCut = 53

N = 5000
Sim Ann = 193 seconds
Cut = 7230
spectralCut = 172

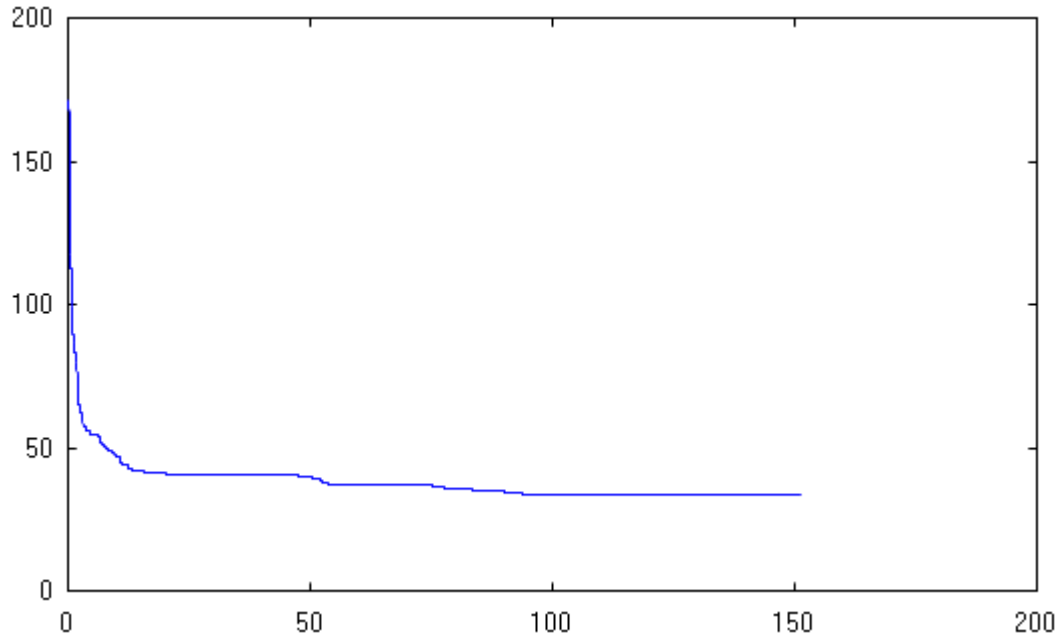
N = 100000
Sim Ann = 146.4 seconds
Cut = 7247
spectralCut = 228

Crossover and mutation

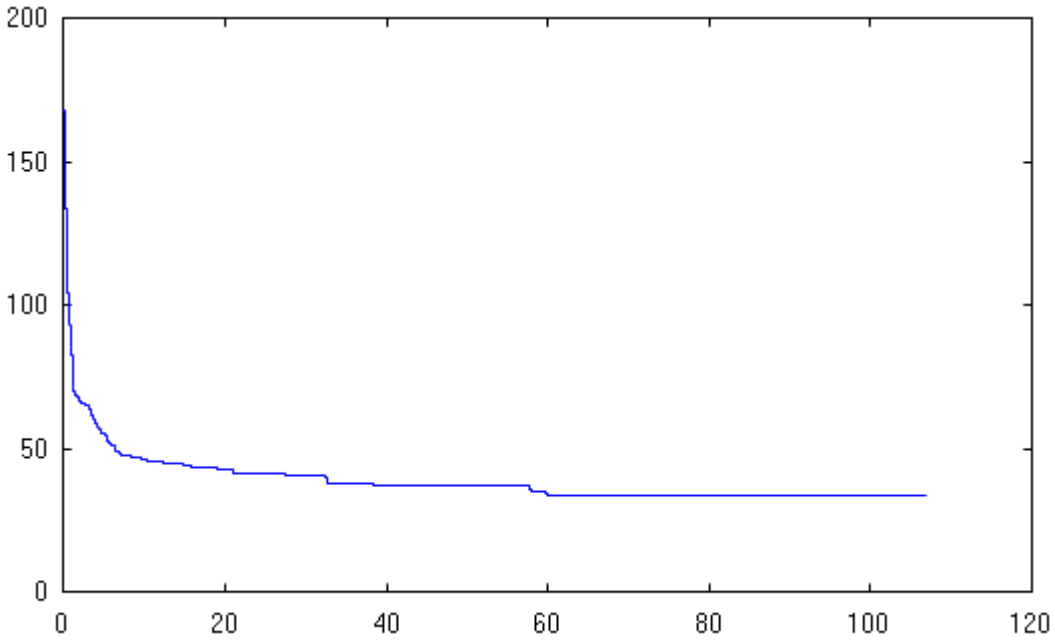
crossover 0.0 - mutation rate 0.0



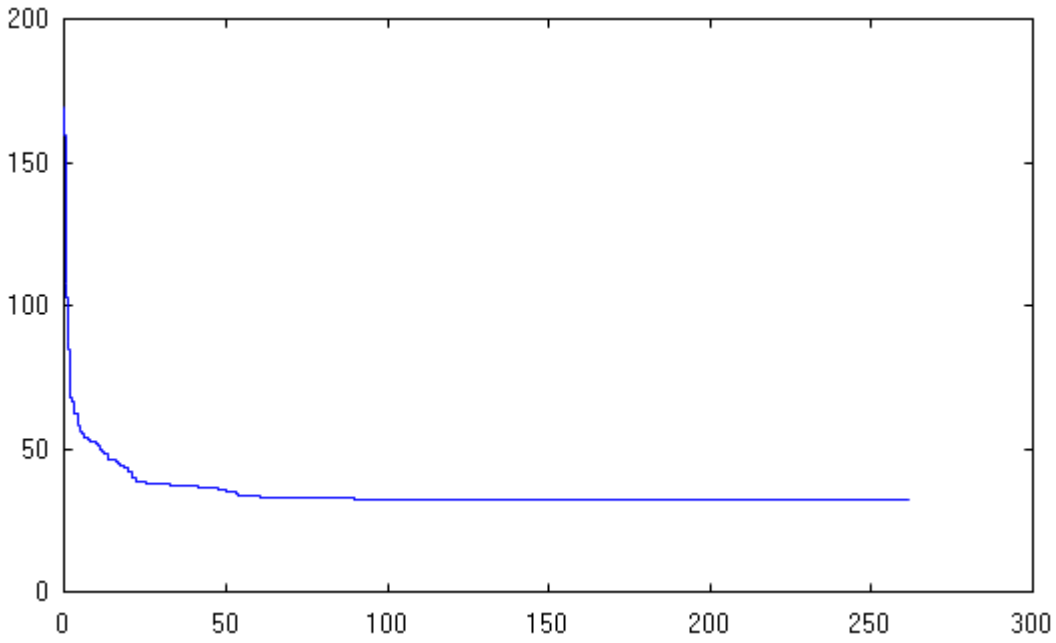
crossover 0.2 - mutation rate 0.0



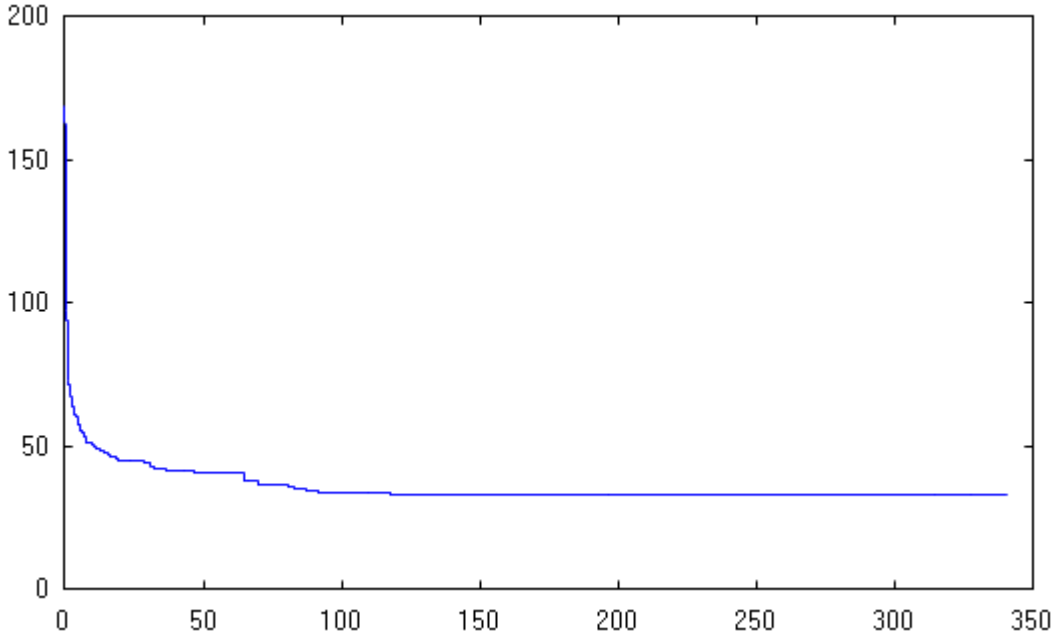
crossover 0.4 - mutation rate 0.0



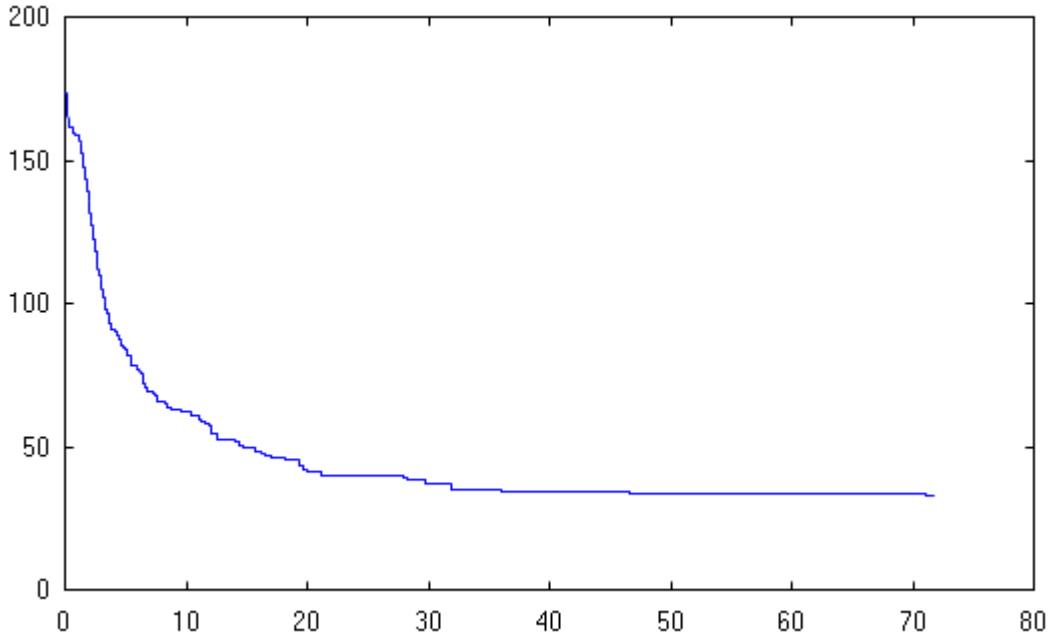
crossover 0.5 - mutation rate 0.0



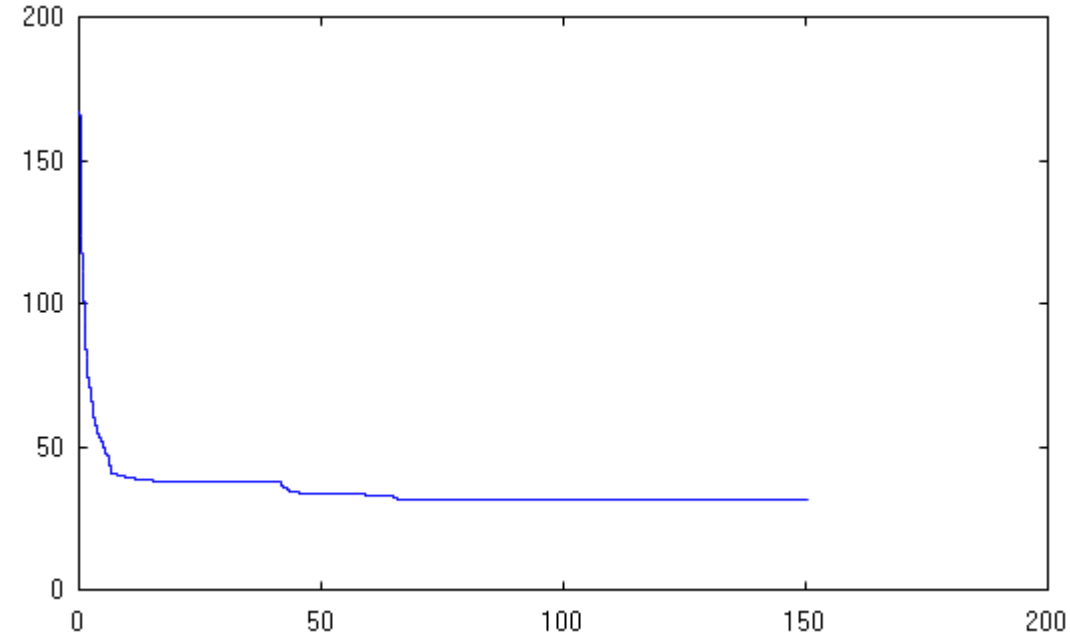
crossover 0.6 - mutation rate 0.0



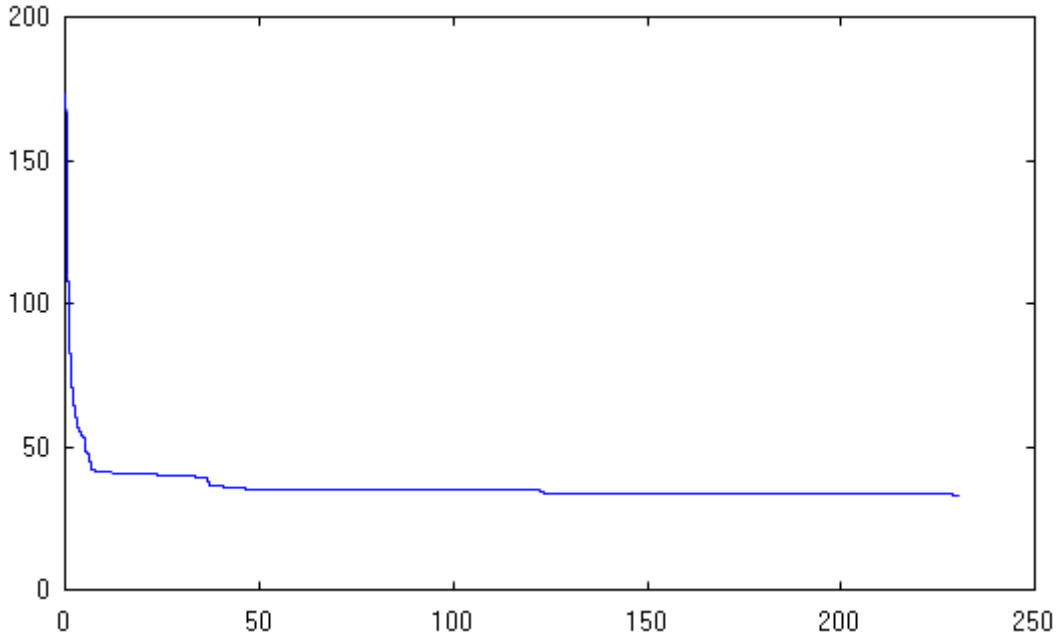
crossover 0.0 - mutation rate 0.1



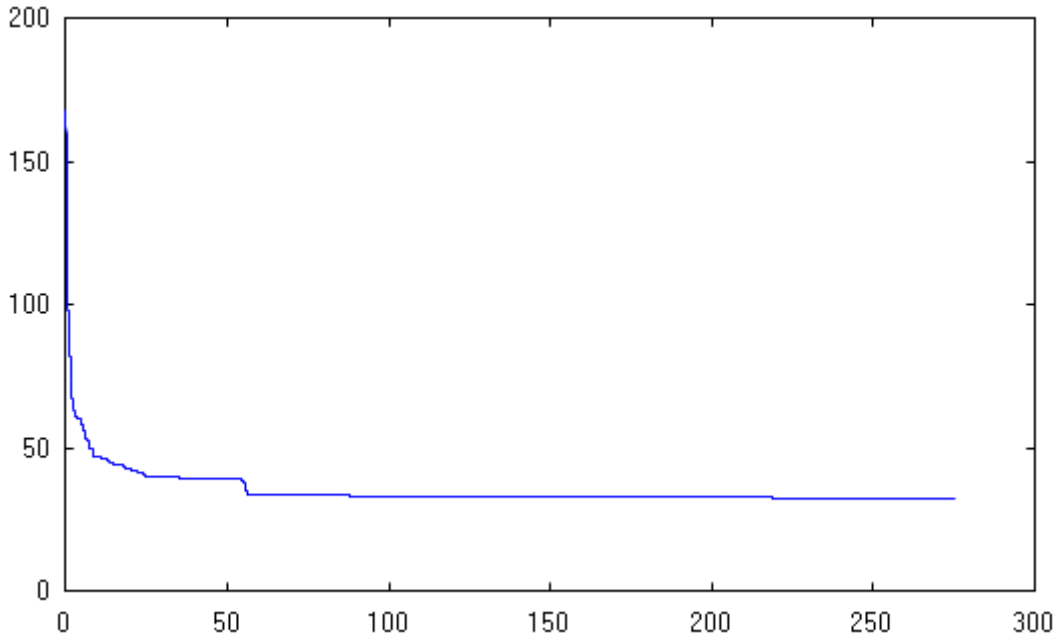
crossover 0.2 - mutation rate 0.1



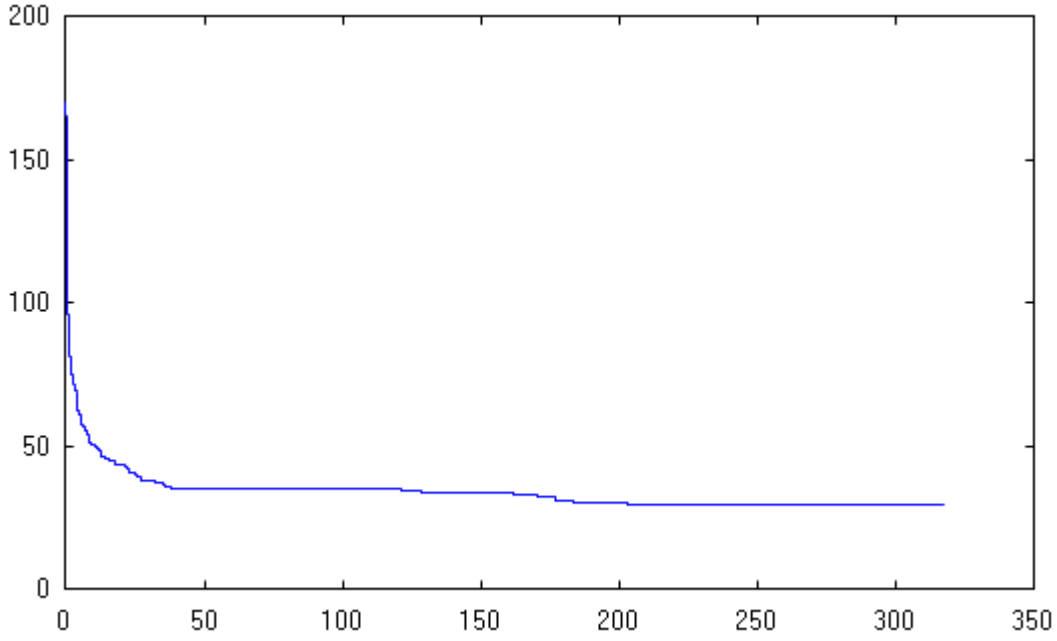
ossover 0.4 - mutation rate 0.1



crossover 0.5 - mutation rate 0.1



crossover 0.6 - mutation rate 0.1



1. What is the best combination of crossover and mutation rate?

   crossover 0.0 - mutation rate 0.0

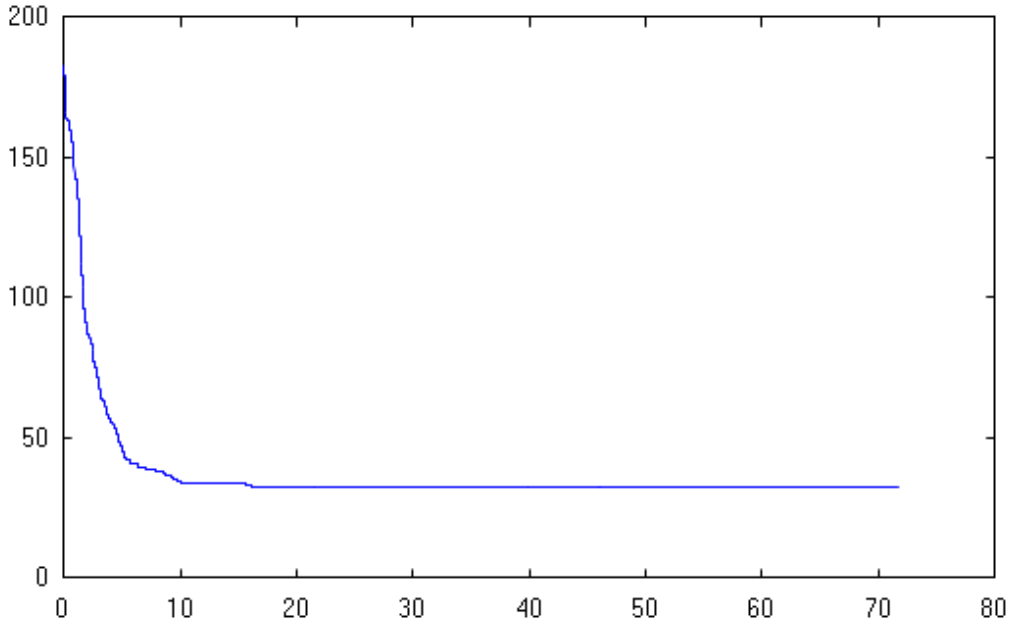
2. Which is more effective on this problem - crossover or mutation?

   Changing mutation doesn’t affect much like changing crossover values. Since that more effective on this problem is Crossover.

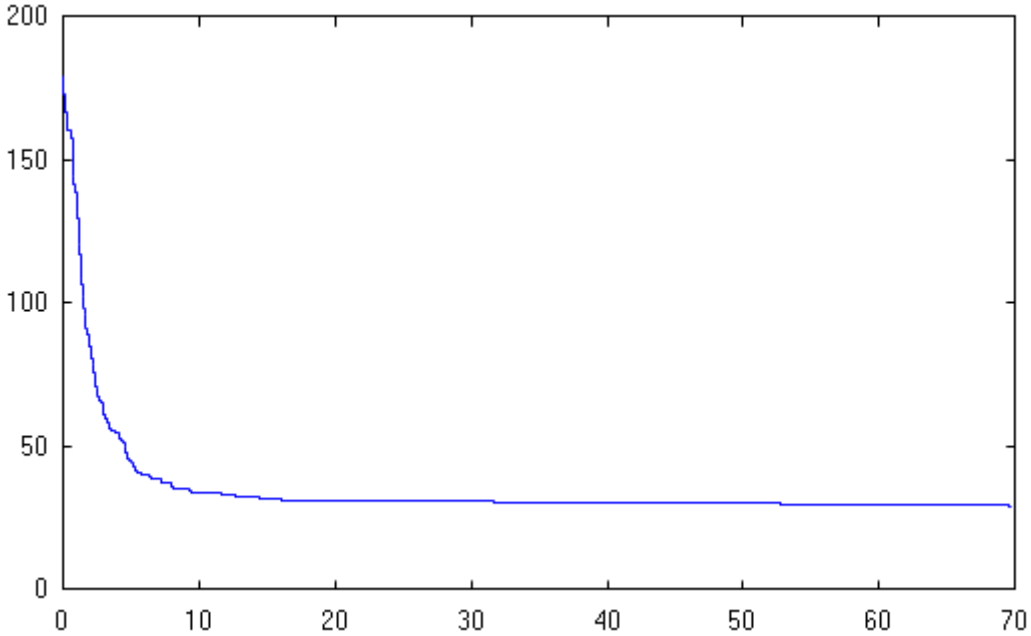
Population Size

When P = 2;

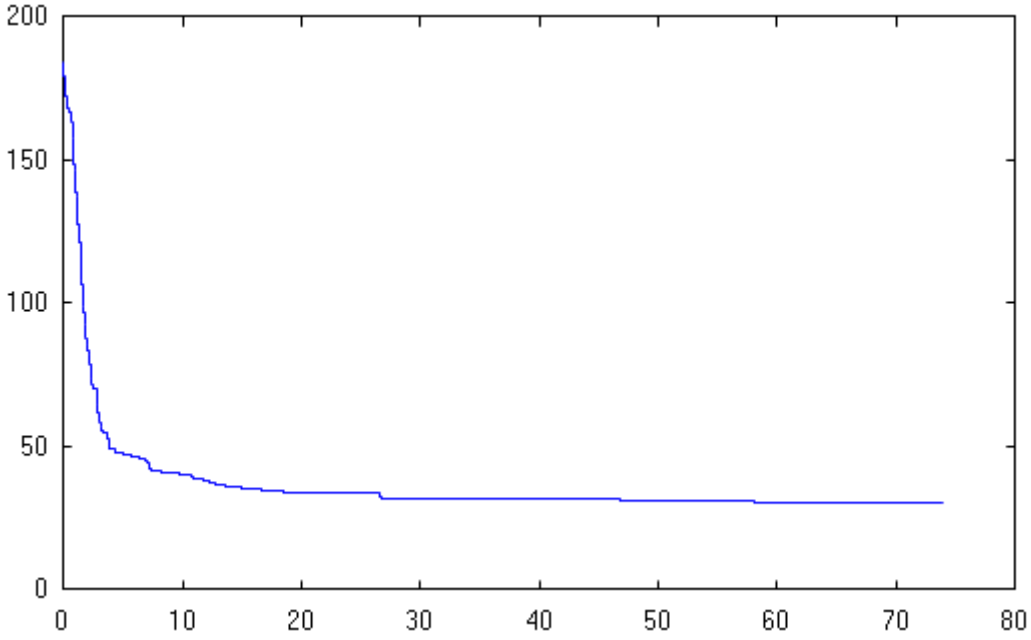
crossover 0.0 - mutation rate 0.0



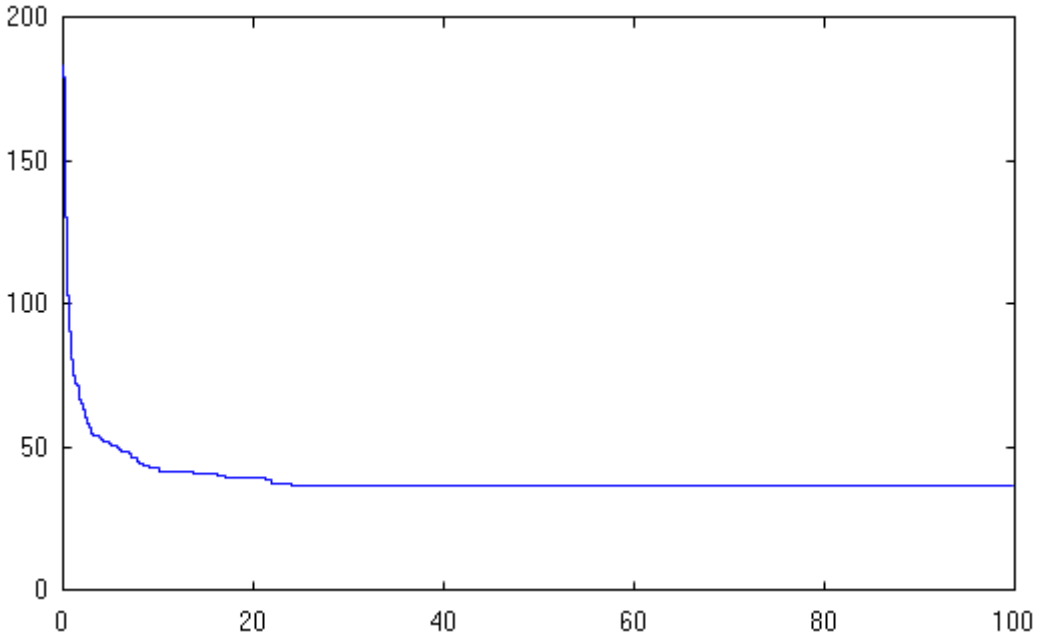
crossover 0.2 - mutation rate 0.0



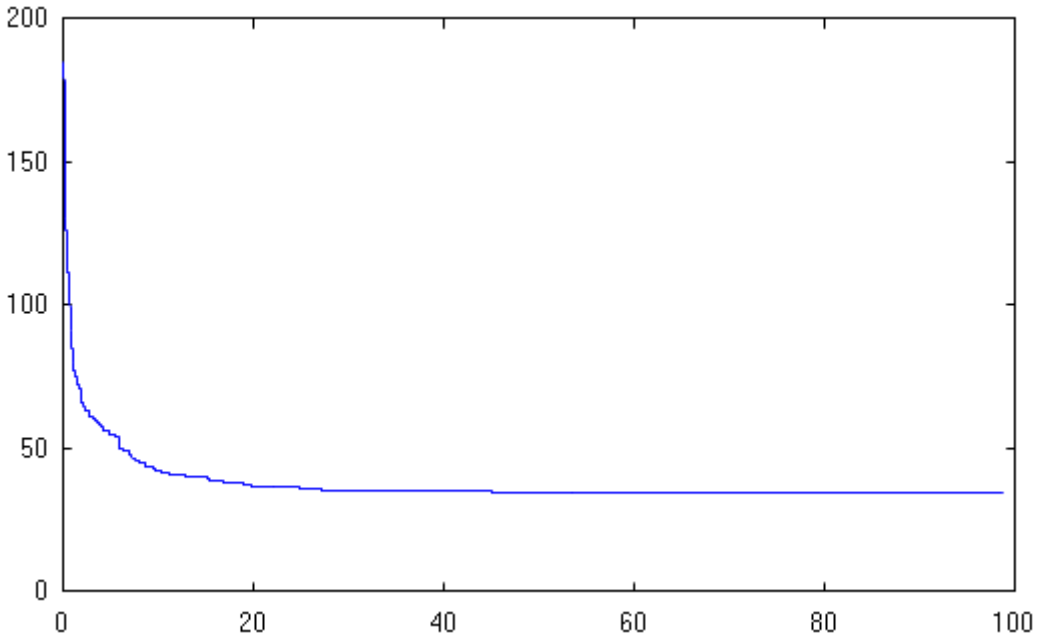
crossover 0.4 - mutation rate 0.0



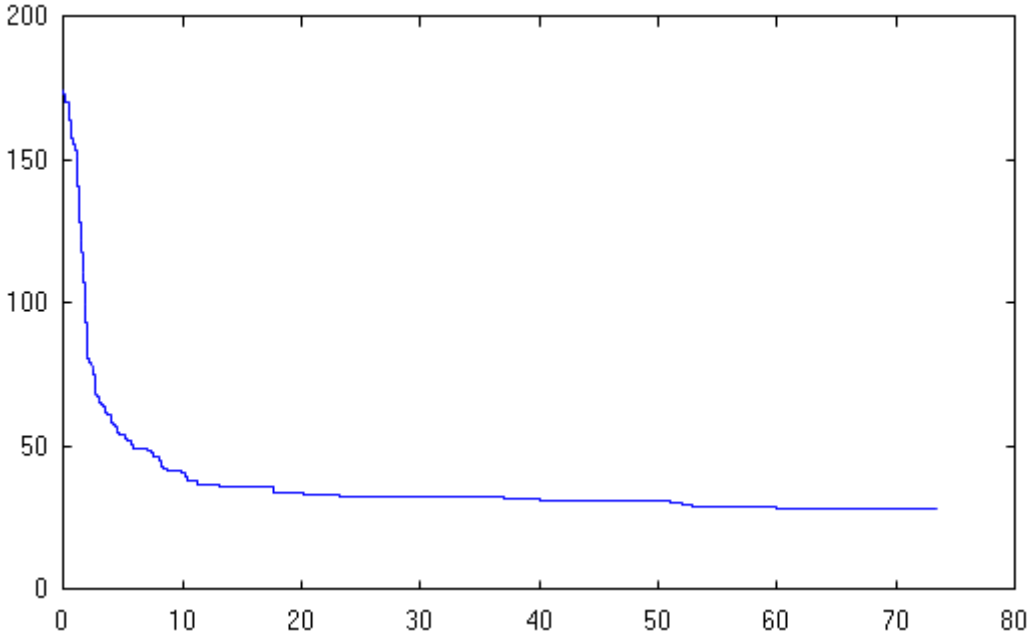
crossover 0.5 - mutation rate 0.0



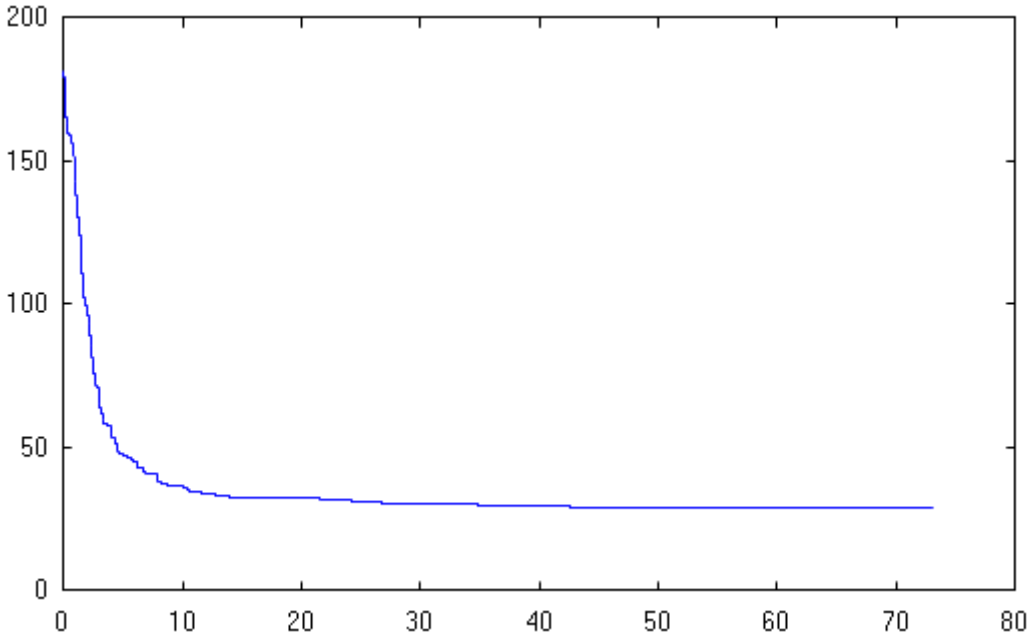
crossover 0.6 - mutation rate 0.0



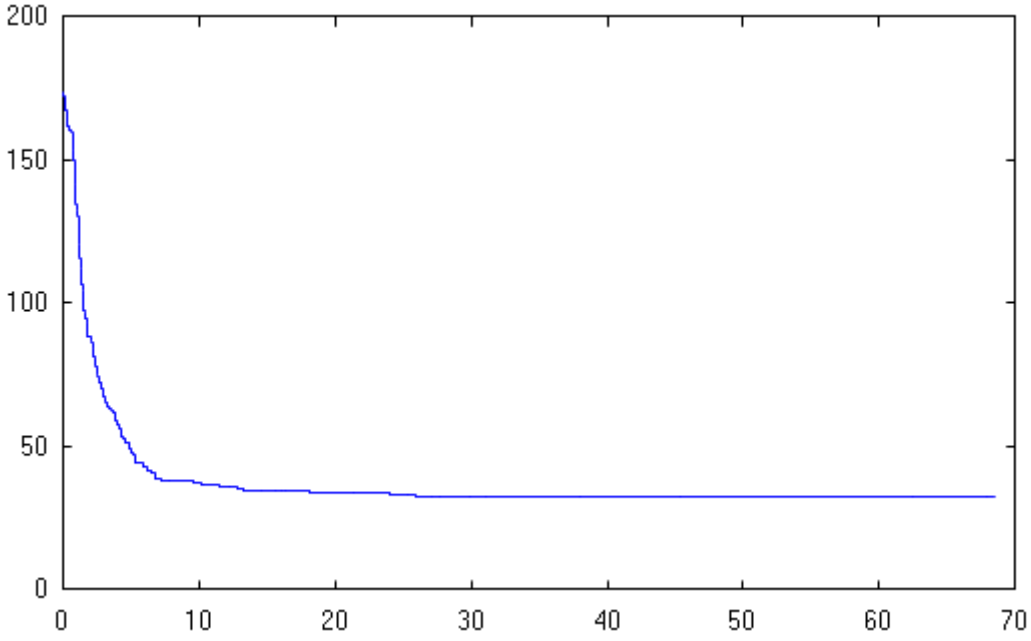
crossover 0.0 - mutation rate 0.1



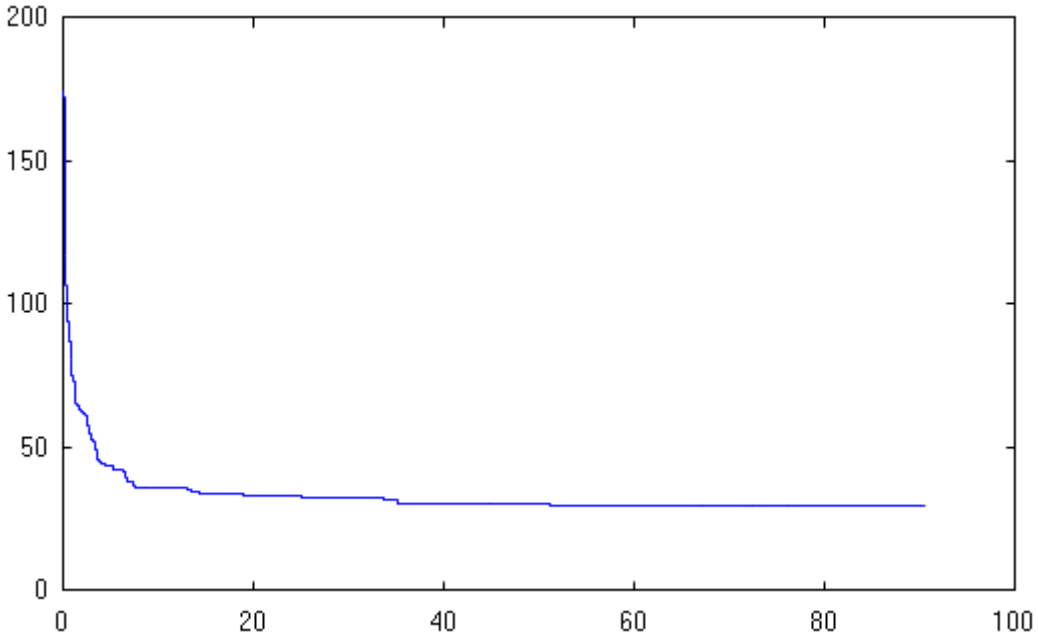
crossover 0.2 - mutation rate 0.1



crossover 0.4 - mutation rate 0.1



crossover 0.5 - mutation rate 0.1



crossover 0.6 - mutation rate 0.1