Genetic Algorithm Project

Phase I: Knapsack with Genitor approach

- Problem domain: Knapsack
- Population size: 100
- Crossover: single point, random location
- Mutation: each bit (smallest definable piece) of an offspring creature has a 0.5% chance of mutation (bit must be inverted)
- Static population size - one offspring produced which has to compete for survival (one organism always get eliminated)
- Upon convergence of organisms (all 100 organisms are identical), save one organism, perform cataclysmic mutation on the rest (20% chance of mutation per bit for each of the 99)
- After 3 successive cataclysmic mutations converge on the same organism, end the program.
- Record the best solution
- Record the total number of times the fitness function was used (compare this number to an exhaustive search)
- Be prepared to show your working program and results on the specified class day

Phase II: pick a different domain

- Choose a different domain (other than Knapsack) and propose an organism representation, fitness function, crossover operator, and mutation effect
- Get your proposal approved by the professor
- Run your program with your proposed attributes and record the results
- Be prepared to show your working program and results on the specified class day

Phase III: Experimentation

- Try out other attributes/methods to enhance Phase II such as:
    - Vary population size
    - Vary mutation rate
    - Make changes to crossover operator
    - Use hill climbing techniques to augment answer
    - Implement an island model
    - Add in random organisms
    - Change the organism representation
- Record your results
- Be prepared to show your working program and results on the specified class day

Phase IV: Written Report - Write a report reflecting on the project
- Report format should follow 2016 ACM SIG Conference Proceedings standards and be no longer than 6 pages (same standards as Project 1)
- Your paper should include:
    - title and author information
    - an abstract
    - categorization and keywords
    - introduction
    - problem background and/or related work
    - methodology for all three phases (be sure to include specific enough information so that your project could be reproduced)
    - results
    - discussion of results
    - future work - what other optimization would you try if you had more time?
    - references
- Turn in your report on the specified day.

Please ask questions early about any guidelines or instructions that seem unclear.