DSA5113 Final Exam

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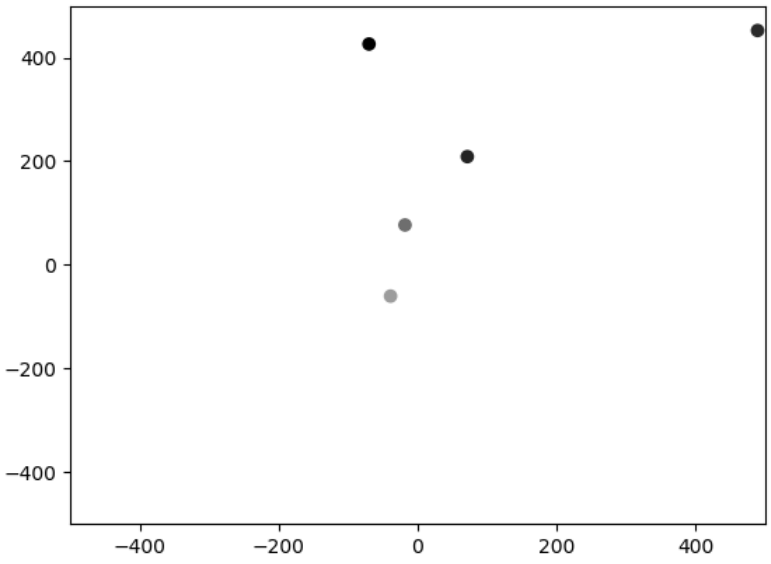
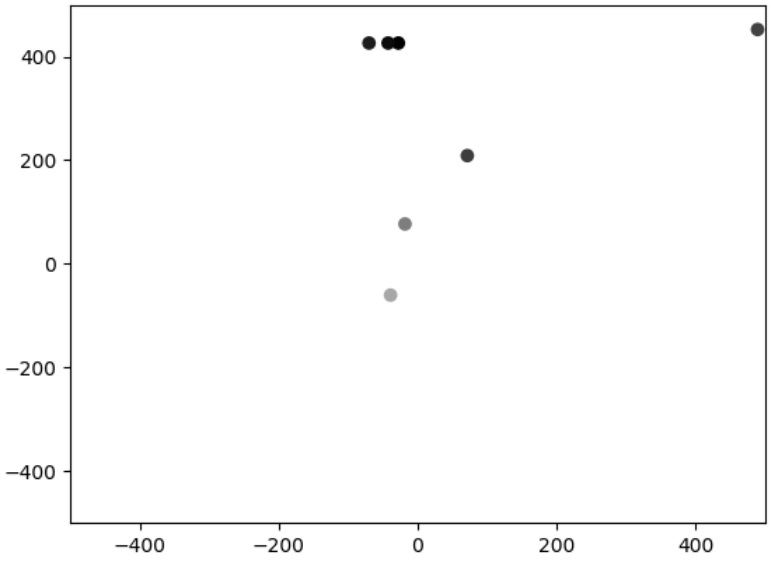
Problem 1: Genetic Algorithm

(a) 2D

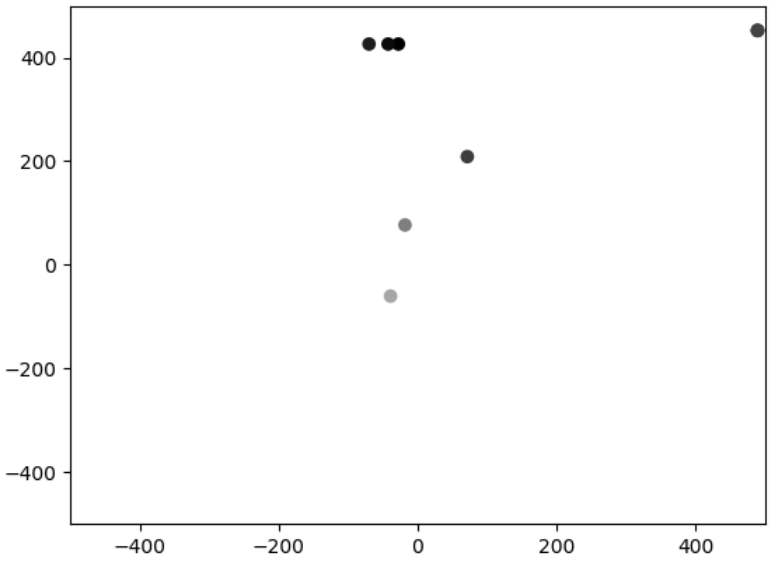
0 Generation



1 Generation



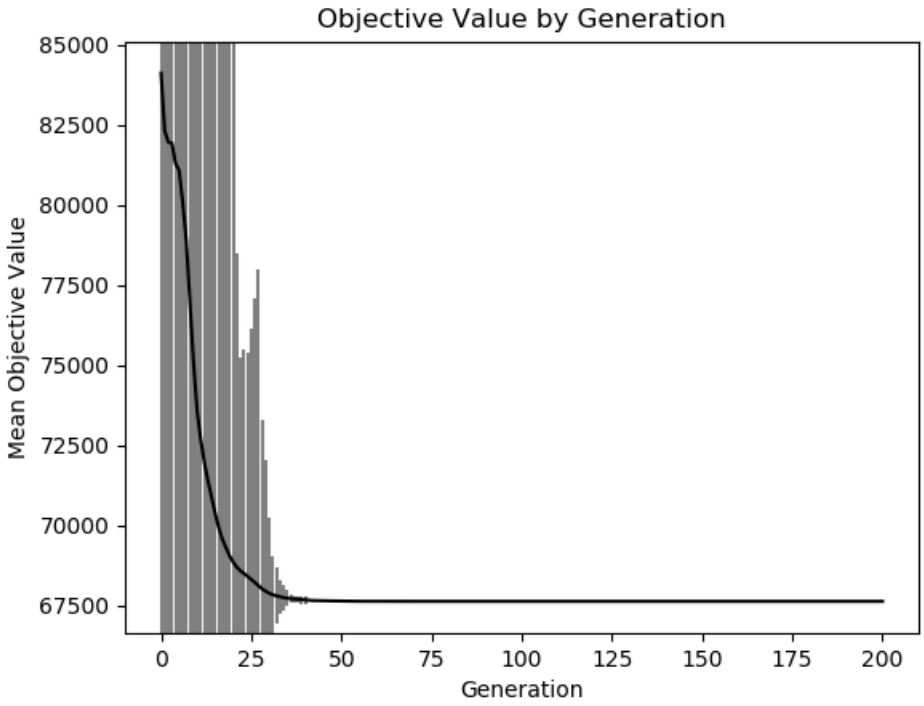
2 Generation



Best Solution	**181.51573693026376**
Population size	**6**
Cross over rate	**0.9**
Mutation rate	**0.34**
Solutions evaluated	**6,000**

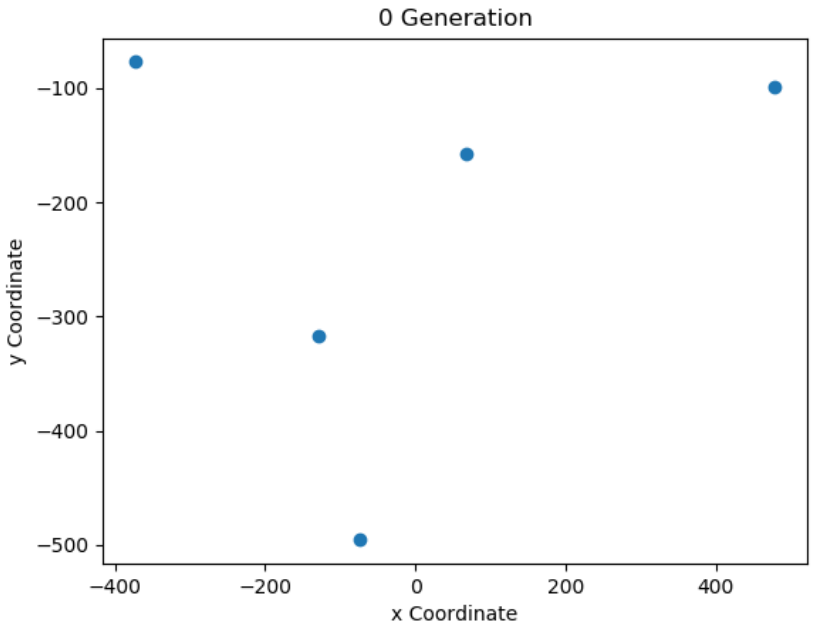
(b) 200D

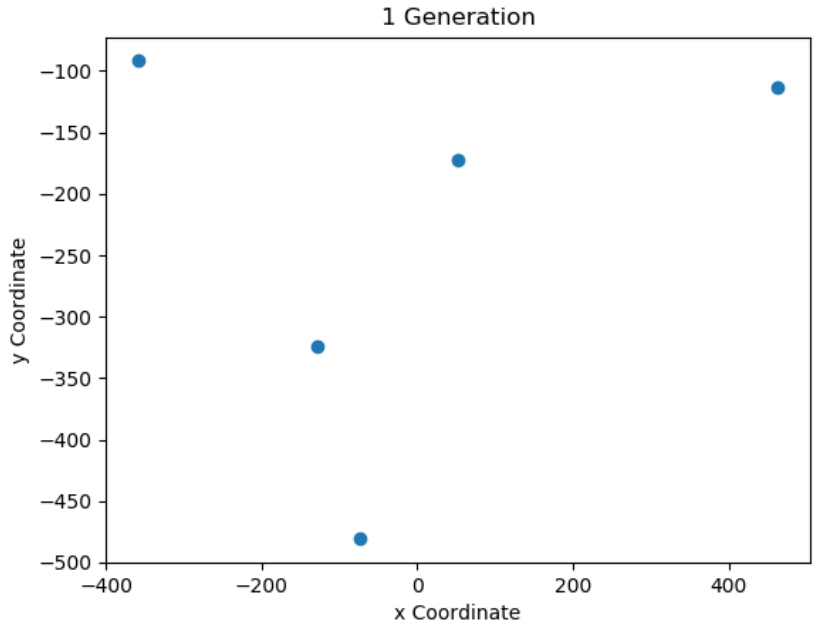
Best Solution	**67,630.01629396173**
Population size	**300**
Cross over rate	**0.9**
Mutation rate	**0.25**
Solutions evaluated	**60,000**



Problem 2: Particle Swarm Optimization

(a) 2D





Best Solution	**296.1067484298893**
Population Size	**6**
Max Velocity	**9**
Phi_1	**0.97**
Phi_2	**0.97**
Solutions Evaluated	**6,600**

(b) 200D

Best Solution	**44,358.6932616163**
Population Size	**5**
Max Velocity	**12**
Phi_1	**0.95**
Phi_2	**0.95**
Solutions Evaluated	**20,000**

(c) 200D PSO (Neighborhood)

We chose to implement the ring neighborhood method. When comparing at the same parameters as our initial PSO implementation the PSOn implementation decreased the optimal solution at a much smoother and more gradual rate but reached a plateau at only 4,000 solutions explored. We then decided to test the PSOn implementation with a maximum velocity 25% less than that of our original implementation. This seemed appropriate given the smooth solution decent it previously displayed. Here we also saw a plateau arise in the optimal solution, however, this occurred roughly one thousand iterations later. We also ran trials adjusting parameters which affected how the velocity was

updated. In all other examinations PSOn failed to surpass our original implementation of PSO. Results for PSOn's best solution are provided below.

Best Solution	**47,858.36580006191**
Population Size	**5**
Max Velocity	**15**
Phi_1	**1.95**
Phi_2	**1.95**
Solutions Evaluated	**10,000**