1. Try evolving a solution using just mutation (**no crossover**) 10 (or more) times. How many generations does it appear to take to evolve a solution? How much variation is there in the number of generations taken from run to run? Is this more or less than you expected (both how many generations and the variation in required generations between runs)?

230, 260, 360, 300, 300, 500, 340, 230, 270, 170
There is a great amount of variation in this data, having a maximum that is almost twice that of the minimum. Having spent a while playing around with the simulation beforehand, this was about how many generations we expected it to take.

2. Repeat experiment #1, but use crossover (single crossover point) and mutation. What do you think will happen? How many generations does it appear to take to evolve a solution? What can you conclude from this?

Crossover will greatly reduce the time it takes to evolve a solution, since it allows a greater variety of solutions to be explored while also taking advantage of solutions that are known to work, unlike mutation.

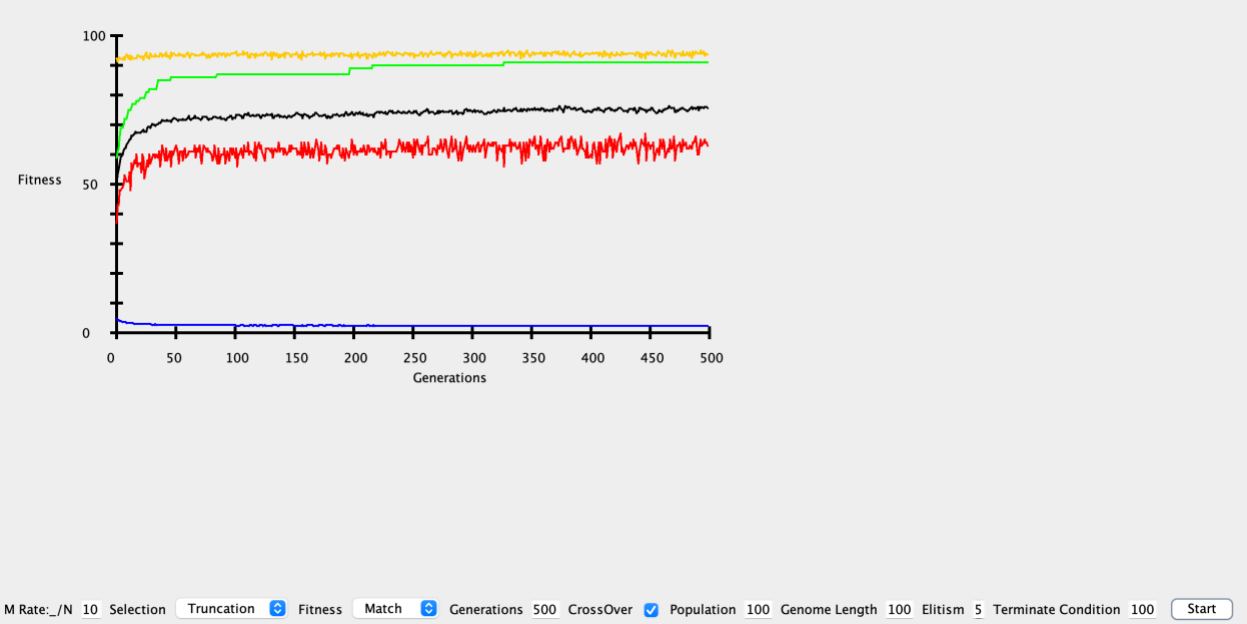
40, 40, 40, 40, 40, 30, 40, 30, 30, 30

Not only does crossover greatly reduce the amount of generations to evolve a solution, it also makes this amount much more consistent.

3. Repeat experiment #1, but with ONLY crossover (single crossover point) meaning you should set the **mutation rate to 0**. What do you think will happen? Run the experiment and report on your findings. Write down your best explanation of the results.

The experiment will flatline rather quickly, as there is no genetic variation being introduced to the population.

After about 30 generations, the diversity dropped to zero and the simulation flatlined.



Devise your own new experiments (at least 1!)

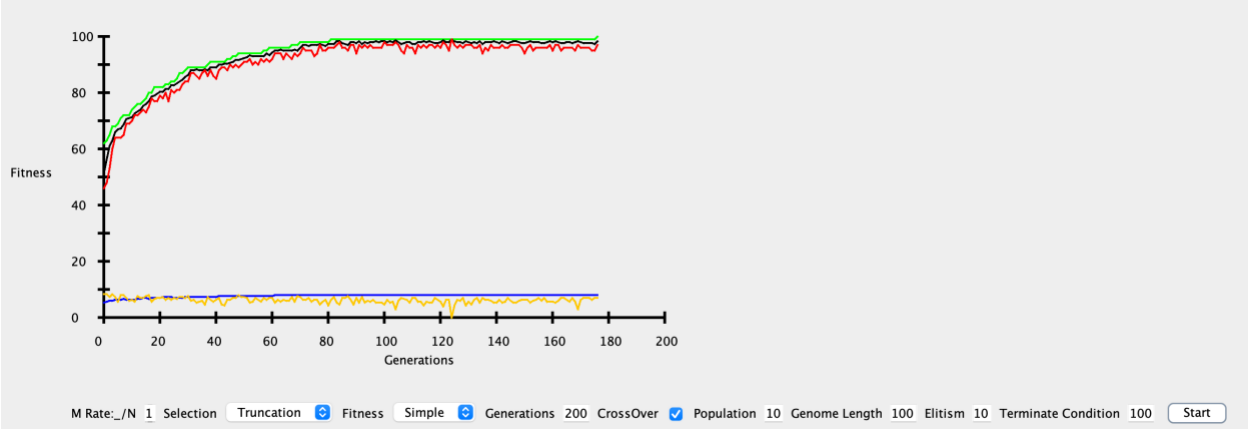
Objective: Explore the effects of population size on evolution success

Population size:	10
Crossover Method:	Single point
mutation rate:	1%
chromosome length:	100
selection method:	Truncation
Elitism:	10
max generations:	200

Hypothesis: The low population size will result in the evolution being greatly slowed

Results:

c.



run #	1	2	3	4	5	6	7	8	9	10
gens	190	80	70	130	110	150	200 (max)	130	130	170

Conclusion: A low population size makes evolution happen much less consistently. However, obtaining a solution is still very possible.