Computational Models in Genetics and living things - EX3-

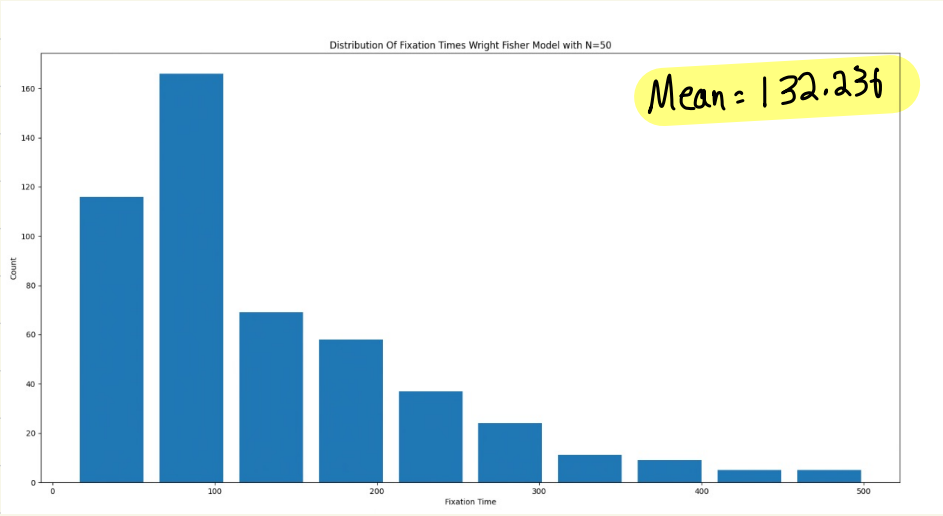
Seaf Aliyan
211367164

attached files: ex3.pdf – This file
assignment.py – Code file

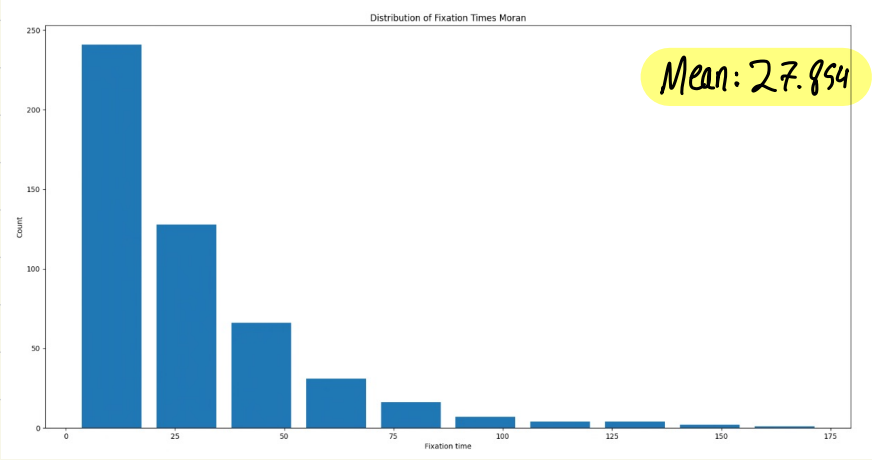
1. Natural Evolution:

1.1) Distrubution of fixation Time:

WF Model:



Moran:



→ Obviously, Moran fixes much faster by changing each allele individual

Variances are

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Wright-Fisher model variance is 0.005776149001790785
Moran model variance is 54691037695.97161
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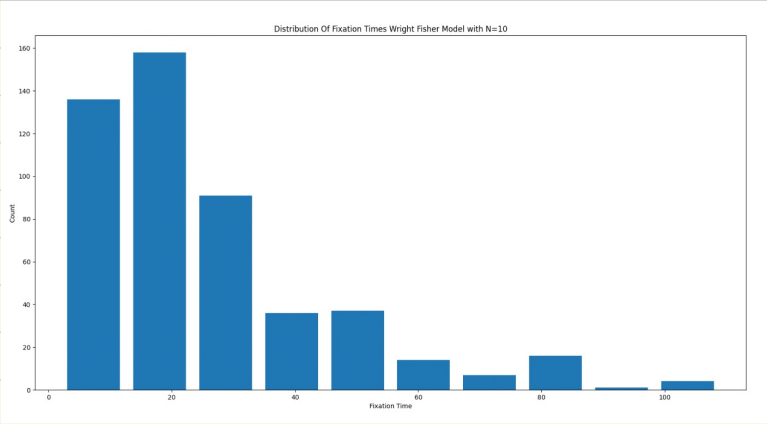
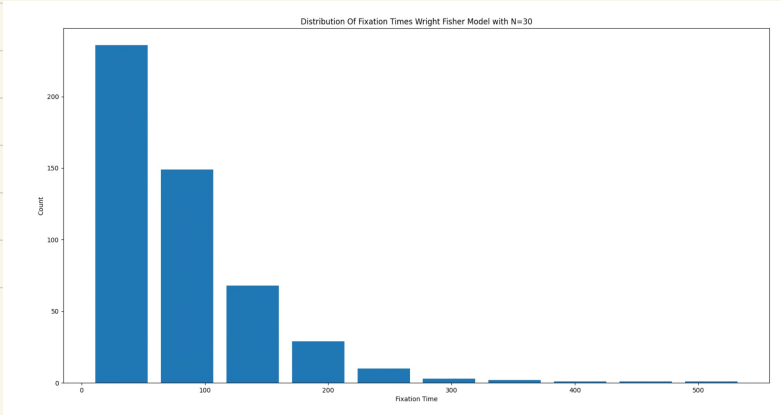
→ Moran has extremly big variance as the change or evolution for every individual is uncorrelated to on the other hand WF changes the population all at once, so result was expeved.

1.2] Choose Wright-Fisher

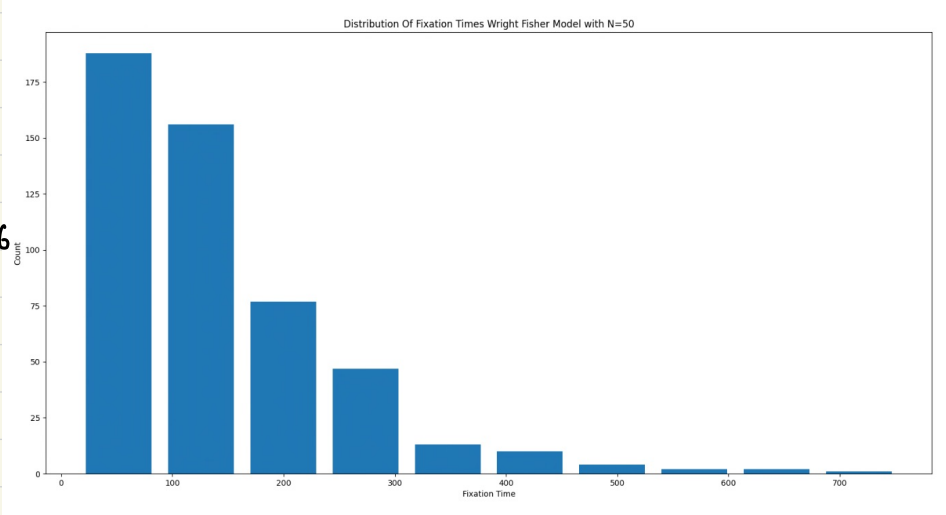
mean: 25.692



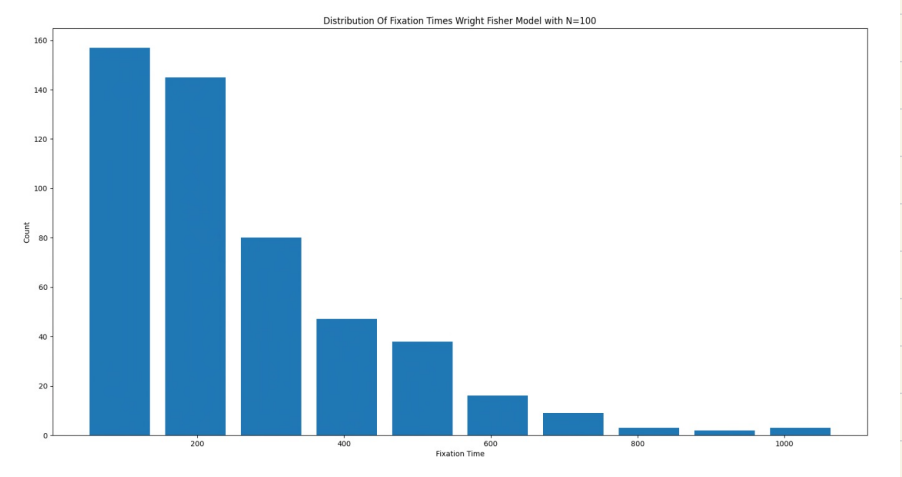
mean: 51.12



mean: 143.26



mean: 258.37



Summary:

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The Mean of Wright Fisher Model is: 25.692
The Mean of Wright Fisher Model is: 51.12
The Mean of Wright Fisher Model is: 143.268
The Mean of Wright Fisher Model is: 258.37
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2. Mutation + Drift:

2.i) Number of each Allele's Type

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Stopped after 5000 generations   A number is 996     a number is 1004
Stopped after 5000 generations   A number is 969     a number is 1031
Stopped after 5000 generations   A number is 1069    a number is 931
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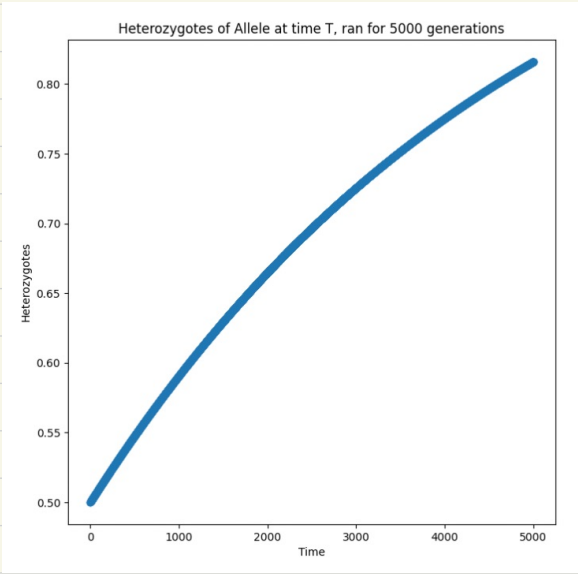
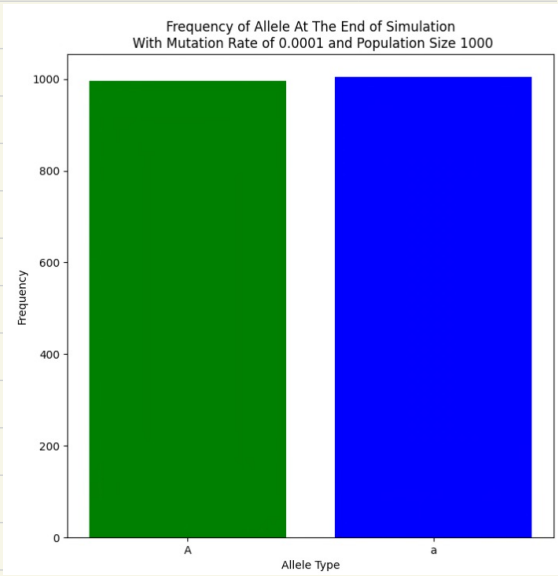
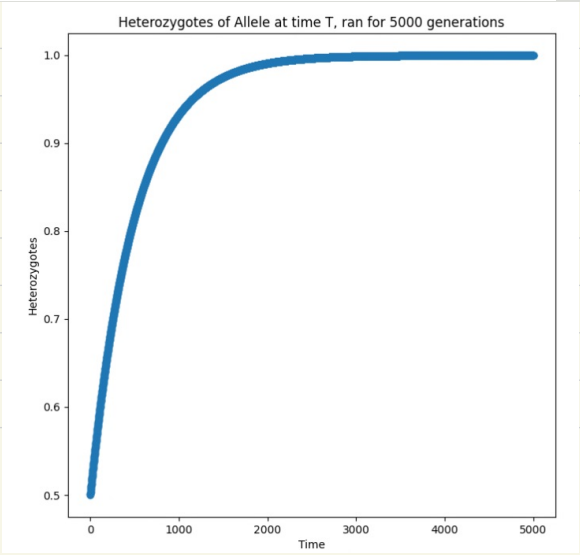
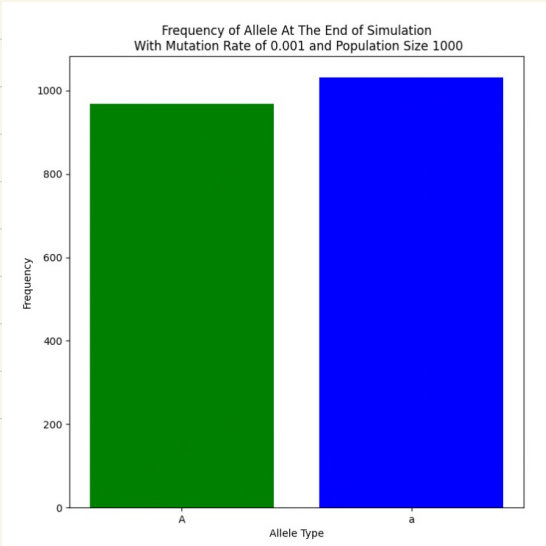
(2.ii) Yes, it equilbrate to 1.

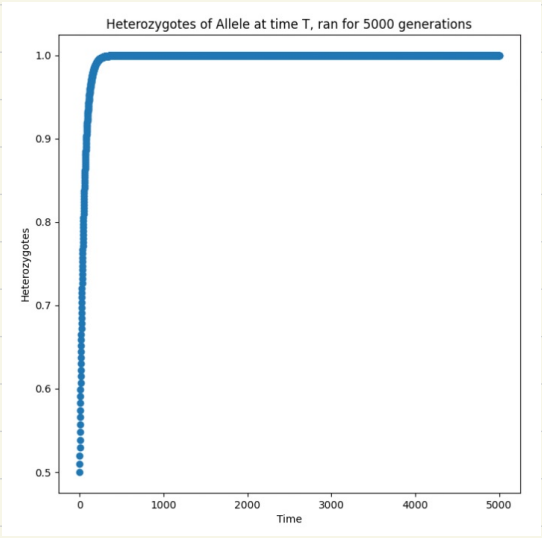
(2.iii)

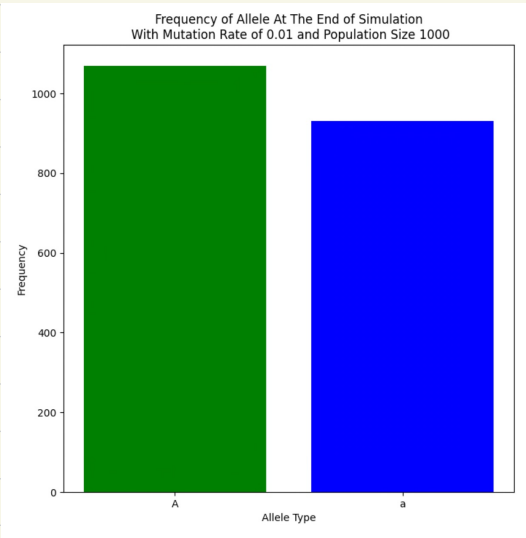












→ as we can see, higher rates resulted in bigger A population.

3.

1. Which population behaves more closely to deterministic dynamics?

Population of 10,000

2. Does the fitter allele always fix?

NO

3. What is the mean time to fixation for each population size?

4. Does the time to fixation depend on the population size and if so how?

Yes