1. What is the solution to the frequency independent replicator?

2. Solve the 2-dimensional continuous time replicator by integration:
\[
\left(\ln \frac{s_1(t)}{1 - s_1(t)}\right) = w_1 - w_2
\]

3. Solve the discrete time replicator by a trade-off of the linear term minus an entropy:
\[
s_1(t + 1) = \arg\max_s \quad sw - s \ln \frac{s}{s_1(t)} - (1 - s) \ln \frac{1 - s}{1 - s_1(t)}
\]

4. Give a high-level description of how we handle “negative shares” in Machine Learning.

5. What is the “curse” of the multiplicative updates?

6. Describe two methods for ameliorating the curse?

7. What is the minimax theorem for zero-sum games?

8. If the row player is the minimizer and the column player the maximizer, what happens to the value of the game if a row is added / a column is added to the game matrix. Give reasons for your answer.

9. How do we in Machine Learning introduce a “long-term memory” into the update?