AI lab 2:

Q1:

1. The dimensionality of the counting-ones problem's search space is directly proportional to the length of the binary string, with each bit position being a separate dimension. b) Search Space Epistasis:
2. The counting-ones problem exhibits no epistasis since the contribution of each bit to the fitness (its value) is independent of the values of other bits.
3. Number of Search Space Optima: There is a single global optimum for the counting-ones problem, which is the binary string consisting entirely of ones.
4. Basins of Attraction: Given the linear nature of the problem, every potential solution (binary string) leads deterministically towards the global optimum without any local optima, so there's essentially one large basin of attraction.
5. Deception: The counting-ones problem is non-deceptive because every incremental increase in the number of ones leads directly towards the global optimum without misleading the search.
6. Neutrality and Neutral Networks: In the basic counting-ones problem, there are no neutral networks because every bit flip either increases or decreases fitness. However, if a variant allowed for certain string positions to be irrelevant, neutral networks could emerge.