

Lab Session 3

21.08.2024

BT 3051 - DSA Biology Lab

1. Problem 1:

You are given the amino acid sequences of five different proteins. Your task is to:

- (a) Write a python program to calculate the molecular weight of each protein using the following five amino acids and their respective molecular weights:
 - Alanine (A): 89.09 Da
 - Cysteine (C): 121.15 Da
 - Aspartic Acid (D): 133.10 Da
 - Glutamic Acid (E): 147.13 Da
 - Glycine (G): 75.07 Da
- (b) Identify the protein with the highest molecular weight.
- (c) Identify the protein with the lowest molecular weight.

The amino acid sequences for the five proteins are as follows:

- Protein 1: ACGDEACGDE
- Protein 2: CGAEDCGAED
- Protein 3: GAGCAGAGCA
- Protein 4: DEGCADEGCA
- Protein 5: ACDGEACDGE

2. Problem 2:

You are given the following DNA sequence:

5' – ATGCGTGAATTCGCTAGCTGAATTCGGCATGCA – 3'

The restriction enzyme **EcoRI** recognizes the sequence **GAATTC** and cuts between the G and A bases. Write a python program to:

- (a) Identify all the EcoRI recognition sites in the given DNA sequence.
 - (b) Determine the fragments generated after complete digestion with EcoRI.
 - (c) Write the sequences of all fragments in 5' to 3' direction.
3. **Problem 3:** Write a Python program that measures the time taken to perform a linear search and a binary search. Display the execution times and compare their efficiency.

Instructions:

- (a) Use the `time` module to measure the execution time of each search algorithm.
- (b) Use Python's built-in `bisect` module for binary search.
- (c) Implement and compare the execution times for:
 - Linear Search
 - Binary Search (using `bisect`)
- (d) Display the execution times and provide a comparison of their efficiency.