BI-GY 7453: Prof. Manpreet S Katari
February 2, 2022

ASSIGNMENT 1 : Due Date : 11-February-2022

1. Criteria for evaluation

- Commenting of code
- Code file you have submitted needs to be executable and satisfy all the test cases
- Clear and comprehensive explanation of your problem solving approach

Question 1. Find the time complexity of following pseudo code and explain the reason behind your answer

1.1. Code Snippet 1

```
int a = 0, b = 0;
for (i = 0; i < N; i++) {
    a = a + rand();
}
for (j = 0; j < M; j++) {
    b = b + rand();
}
```

1.2. Code snippet 2

```
int l, t, k = 0;
for (l = n / 2; l <= n; l++) {
  for (t = 2; t <= n; t = t * 2) {
    k = k + n / 2;
  }
}
```

1.3. Code snippet 3

```
int a = 0, i = N;
while (i > 0) {
  a += i;
  i /= 2;
}
```

1.4. For the next 2 problems.Write a pseudo code or code (in python or R) and explain why do you think your approach of solving this problem is the best both in term of time and space complexity

Question 2. An RNA string is a string formed from the alphabet containing 'A', 'C', 'G', and 'U'. Given a DNA string t corresponding to a coding strand, its transcribed RNA string u is formed by replacing all occurrences of 'T' in t with 'U' in u.
Given: A DNA string t having length at most 1000 nt.
Return: The transcribed RNA string of t.

2.1. Example test case

$$Sample - Dataset : GATGGAACTTGACTACGTAAATT$$
$$Sample - Output : GAUGGAACUUGACUACGUAAAUU$$

Question 3. In DNA strings, symbols 'A' and 'T' are complements of each other, as are 'C' and 'G'. The reverse complement of a DNA string s is the string s^c formed by reversing the symbols of s, then taking the complement of each symbol (e.g., the reverse complement of "GTCA" is "TGAC").
Given: A DNA string s of length at most 1000 bp.
Return: The reverse complement s^c of s.

3.1. Example test case

$$Sample - Dataset : AAAACCCGGT$$
$$Sample - Output : ACCGGGTTTT$$