GEBZE TECHNICAL UNIVERSITY

QUIZ – 2

1. (15 points) Write a function that compares two float numbers and returns True if they are equal, False if not. (Hint: directly comparing with "=" is not meant. Define a function, for a given epsilon value, that checks two values are close enough or not.)

2. (15 points) Compare the following complexities, and put them in order :
   i. O(n!)
   ii. $O(n^2)$
   iii. $O(2^n)$
   iv. O(n log(n))

3. (20 points) What is the main difference between a stack and a queue in terms of data insertion and deletion.

4. (40 points, you may do each sub-question **independently**) For the number sequence $a_{n+1} = 2\ a_{n-1} + a_{n-2}$
   i. Find a mathematical formula that calculates n-th value of this sequence (hint: add a_n to both sides)
   ii. Write a recursive algorithm that calculates n-th value.

5. (40 points, every sub-question is **dependent** to previous one) Using binary tree data structure, write the following code :
   i. Implement a binary tree class (or Node class, they are the same thing)
   ii. Create a random list of length 100 containing integers.
   iii. Insert the values in the random list to the binary tree.