Tsinghua University Combinatorics Final Exam –Fall 2017 (25 Points)

Answer as many problems as you can. Show your work. An answer with no explanation will receive no credit. Write your name on the top right corner of each page. Write the formula with proper explanation. The exact number value of factorials or permutations or combinations are not necessary.

[Total time: 1.5 hours]

Name : Student ID:

1. When generating the permutation of {1, 2, …, 7}, determine the previous permutation of “2631457” in lexicographic order. ( ) (2 points)
2. There are 7 students who are trying to get their quiz papers from TA. If everyone just randomly picks up one quiz paper, how much is the probability that at least one of them could have his/her quiz paper? (5 points)
3. We want to place numbers 1 to 10 into a circular permutation, please proof that no matter how we place all the numbers, there will be three numbers which are adjacent with each other and the sum of them is no less than 17. (5 points)
4. Determine a recurrence for the number of ternary strings (made up of 0s, 1s, and 2s) of length n that do not contain two consecutive 0s or two consecutive 1s. Then solve the recurrence relation for an. (7 points)
5. Transform the following problems into augmented form and solve it by simplex method by showing the first two tables.(6 points)

