

CS 6301.002. Implementation of advanced data structures and algorithms  
Spring 2016  
Short Project 5 (Permutations and combinations)  
Thu, Apr 7, 2016

Ver 1.0: Initial description (Apr 7, 3:00 PM).

Due: 1:00 PM, Thu, Apr 14.

Solve at least one problem from the following list. First solution will be graded out of 10. Each additional problem will be considered for 1 extra point.

### **a. Permutations and combinations**

Implement the following algorithms discussed in class: (a) Combination( $A, n, k$ ), (b) Permute( $A, n$ ). For Permute(), implement Take 2 and Heap's algorithms, and compare their running times for  $n = 8..14$ .

### **b. $nPk$**

Combine the solutions to part a to get Permute( $A, n, k$ ): ordered sets of cardinality  $k$  from a set of size  $n$ .

### **c. Knuth's L algorithm**

Implement Knuth's algorithm for generating permutations in lexicographic order.

### **d. Enumeration of topological orders in DAGs**

Given a DAG as input (use input format used by readGraph), visit and print all topological orders of the graph.