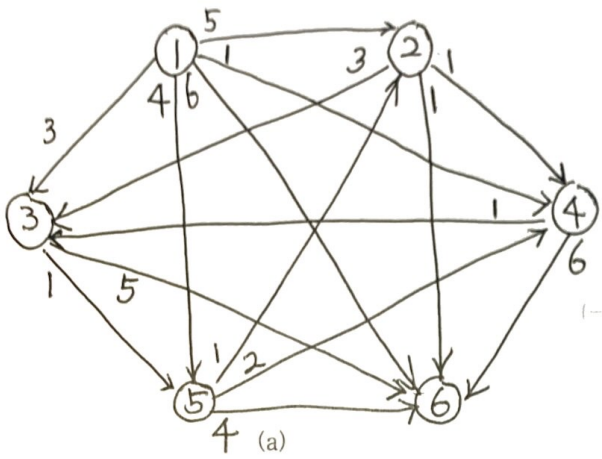
Final Exam (Design and Analysis of Algorithms)

AM 11:00 - PM 12:30 Monday 6/22/2020

1. (20pts) Run the Dijkstra's algorithm on the following directed graph (a). Just give the step-by-step descriptions of the arrays touch[2..6] and length[2..6]. Draw the corresponding shortest path spanning tree.



(a)

0	2	6	5	3
5	0	1	4	2
4	6	0	2	5
3	3	5	0	6
2	1	4	3	0

(b)

2. (20pts) Given $(d_0, d_1, \cdots, d_5)$ = (6, 3, 2, 3, 2, 5), solve the chained matrix multiplication problem. You must construct array M and array P. What is the optimal order?

3. (20pts) (자동차 경주 대회) Given a problem instance as in the right hand side, solve the problem. Just give the step-by-step descriptions of the arrays T[0..6] and P[0..6]. What is the final output?

160

5

90	40	30	80	50	100

10 7 3 6 9

4. (20pts) Produce a pruned state space tree by using the branch-and-bound algorithm, given the above TSP problem instance (b). Draw the optimal tour.

5. (20pts)
   (a) Give the names of 3 on-line algorithms that you learned in our class. Give the names of 5 off-line algorithms that you learned in our class.
   (b) In the deterministic algorithm for finding the k-th smallest element, what is the recursive equation of the time complexity if the input is divided into n/21 sets? What is the final time complexity? Why?

God and Lord Jesus Christ bless you so much!