Operations Research, Spring 2015

Pre-lecture Problems for Lecture 10: Network Flow Models

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Note. You do not need to submit anything.

1. (0 point) Consider the directed network

$$G = (V, E) = \Big(\Big\{ O, A, B, C, D, E, T \Big\}, \Big\{ (O,A), (O,B), (O,C), (A,B), (A,D), (B,C), (B,D), (B,E), (C,E), (D,E), (D,T), (E,T) \Big\} \Big)$$

   with arc weights defined in the following table:

(i,j)	(O,A)	(O,B)	(O,C)	(A,B)	(A,D)	(B,C)
weight	2	5	4	2	7	1
(i,j)	(B,D)	(B,E)	(C,E)	(D,E)	(D,T)	(E,T)
weight	4	3	4	1	5	7

   (a) Depict G.
   (b) Treat arc weights as distances, formulate the shortest path problem from O to T as an IP.
   (c) Show that the coefficient matrix of the IP in (b) is totally unimodular.

2. (0 point) Consider the network G in Problem 1.

   (a) Treat arc weights as capacities, formulate the maximum flow problem from O to T as an IP.
   (b) Show that the coefficient matrix of the IP in (a) is totally unimodular.