

**Problem 4 - Bipartite Matching:** OpenTable is managing the dinner reservations at a restaurant. There are  $m$  tables available for reservations, numbered as  $1, 2, \dots, m$ . Assume (for simplicity) that each table can only accommodate one dinner reservation. Tables have different sizes: table  $j$  can sit  $t_j$  customers. There are  $n$  requests for a reservation, numbered  $1, 2, \dots, n$ . Reservation  $i$  is for a group of  $r_i$  people. Due to unforeseen circumstances, the restaurant cannot accommodate all the reservations and some of them have to be canceled.

- (a) Formulate the problem of maximizing **the number of customers** that we can accommodate as a binary programming problem (not as a bipartite matching problem).
- (b) Consider the problem of maximizing **the number of reservations** that we can accommodate. Discuss how this problem fits the framework of the Bipartite Matching problem. Draw a sample network for this problem. What are the nodes, the arcs, and the arc capacities?