LINEAR PROGRAMMING & NETWORKS – Prof. Richard B. Goldstein

TRANSPORTATION

$\text{Min}\sum_{i=1}^{m}\sum_{j=1}^{n} c_{ij}x_{ij}$		c_{ij} = cost of sending 1 item from i to j x_{ij} = 0 or 1 where 1 indicates item is transported from i to j
s.t.	$\sum_{j=1}^{n} x_{ij} \le q_i$ for all i	capacity limits at i^{th} location
	$\sum_{i=1}^{m} x_{ij} = r_j$ for all j	demand at j^{th} locations

ASSIGNMENT

$\text{Min}\sum_{i=1}^{m}\sum_{j=1}^{n} c_{ij}x_{ij}$		c_{ij} = cost of assigning i^{th} person the j^{th} position x_{ij} = 0 or 1 where 1 means i^{th} person does j^{th} position
s.t.	$\sum_{j=1}^{n} x_{ij} \le 1$ for all i	every job must be done
	$\sum_{i=1}^{m} x_{ij} = 1$ for all j	everyone gets 1 job to do

SHORTEST-ROUTE

$\text{Min}\sum_{i}\sum_{j} c_{ij}x_{ij}$ — c_{ij} = time/distance from node i to node j — x_{ij} = 0 or 1

s.t. $\sum_{j} x_{1j} = 1$ — origin node – every optimal path must start here at node 1

$\sum_{i} x_{ik} - \sum_{j} x_{kj} = 0$ — amount in – amount out = 0 for all intermediate nodes k

$\sum_{j} x_{jm} = 1$ — final node – every optimal path must end here at node m

MAXIMAL FLOW

Max x_{m1} — final node m back to node 1
where x_{ij} = amount flowing from node i to j

s.t. $x_{ij} \le q_{ij}$ — less than maximum capacity from node i to j for all branches

$\sum_{i} x_{ik} - \sum_{j} x_{kj} = 0$ — flow in – flow out = 0 for all nodes k