# An Assignment Problem

Scott and Associates, Inc., is an accounting firm that has three new clients. Project leaders will be assigned to the three clients. Based on the different backgrounds and experiences of the leaders, the various leader-client assignments differ in terms of projected completion times. The possible assignments and the estimated completion times in days are

Project Leader	Client		
	1	2	3
Jackson	10	16	32
Ellis	14	22	40
Smith	22	24	34

a. Develop a network representation of this problem.
b. Formulate the problem as a linear program, and solve. What is the total time required?
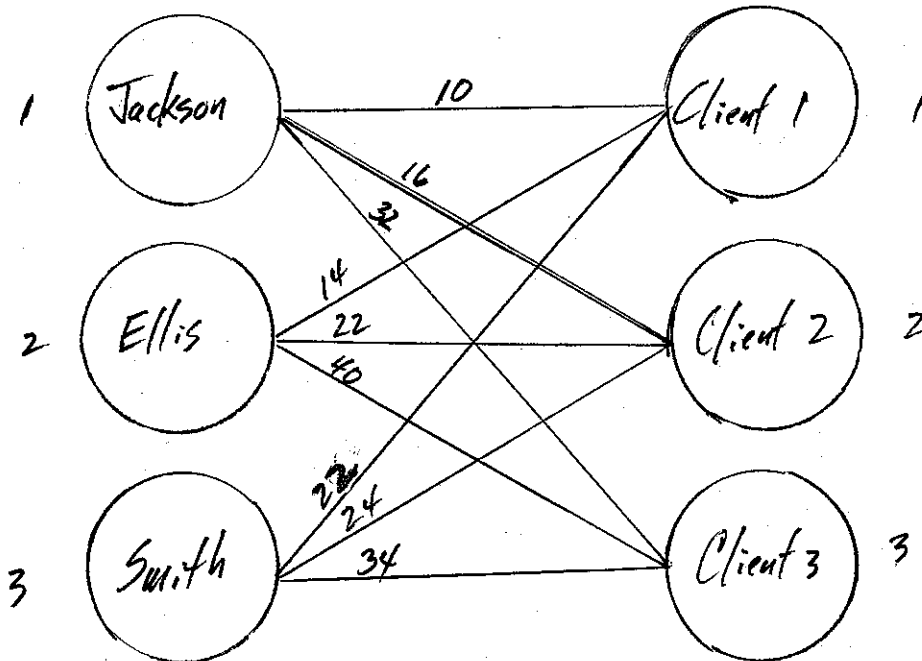
A Network Representation

let $x_{ij} = \begin{cases} 1, & \text{if project leader } i \text{ is assigned to client } j \\ 0, & \text{otherwise} \end{cases}$

Minimize $10X_{11} + 16X_{12} + 32X_{13} + 14X_{21} + 22X_{22} + 40X_{23} + 22X_{31} + 24X_{32} + 34X_{33}$

s.t. $X_{ij} \geq 0$ and

$$
\begin{cases}
X_{11} + X_{12} + X_{13} & \leq 1 \\
\quad X_{21} + X_{22} + X_{23} & \leq 1 \\
\quad\quad X_{31} + X_{32} + X_{33} \leq 1 \\
X_{11} \quad\quad + X_{21} \quad\quad + X_{31} & = 1 \\
\quad X_{12} \quad\quad + X_{22} \quad\quad + X_{32} & = 1 \\
\quad\quad X_{13} \quad\quad + X_{23} \quad\quad + X_{33} = 1
\end{cases}
$$

Solving→ optimal value of objective function is 64
optimal assignment $X_{12} = 1$, $X_{21} = 1$, $X_{33} = 1$
and otherwise $X_{ij} = 0$