





Using Linear Programming to Find a Critical Path

- Let x_i = the time that the event corresponding to node j occurs
- Let t_{ii}=the time to complete activity (i,j) •
- For each activity (i,j), we know that before node j occurs, node • i must occur and activity (i,j) must be completed

$$\Rightarrow x_j \ge x_i + t_{ij}, \forall (i, j)$$

- Let 1 be the index of the start node •
- Let F be the index of the finish node (i.e., when the project is completed)
- LP objective function is to minimize $x_F x_1$, i.e., the total project











	Task 1	Task 2	Task 3	Task 4	Task5
Worker 1	\$200	\$400	\$500	\$100	\$400
Worker 2	\$400	\$700	\$800	\$1,100	\$500
Worker 3	\$300	\$900	\$800	\$1,000	\$500
Worker 4	\$100	\$300	\$500	\$100	\$400
Worker 5	\$700	\$100	\$200	\$100	\$200
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Page The Assignment Problem

 $\min 200x11 + 400x12 + 500x13 + 100x14 + 400x15 + 400x21 + 700x22 + 800x23 + 100x14 +$ 1100x24 + 500x25 + 300x31 + 900x32 + 800x33 + 1000x34 + 500x35 + 100x41 + 300x42 + 500x35 + 500x55 +500x43 + 100x44 + 400x45 + 700x51 + 100x52 + 200x53 + 100x54 + 200x55

s.t.

x11+x12+x13+x14+x15=1	! worker 1					
x21+x22+x23+x24+x25=1	! worker 2					
x31+x32+x33+x34+x35=1	! worker 3					
x41+x42+x43+x44+x45=1	! worker 4					
x51+x52+x53+x54+x55=1	! worker 5					
x11+x21+x31+x41+x51=1	! task 1					
x12+x22+x32+x42+x52=1	! task 2					
x13+x23+x33+x43+x53=1	! task 3					
x14+x24+x34+x44+x54=1	! task 4					
x15+x25+x35+x45+x55=1	! task 5					
! and all variables nonnegative						
	118					

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