

Problem:

Clare Walker sells hospital supplies throughout the Midwest and Plains states. She depends on small, local commuter airlines for transport between cities she must visit this week as well as between these cities and her home in Kansas City. In which order should Clare visit cities to minimize her total air fare cost for the week.

From	To				
	Lincoln	Davenport	St.Louis	Tulsa	Wichita
Kansas City	200\$	260\$	75\$	125\$	125\$
Lincoln		330\$	145\$	180\$	100\$
Davenport			100\$	300\$	275\$
St.Louis				110\$	165\$
Tulsa					180\$

Solution:

a. Variables

- X_{KL} : The selection of Kansas to Lincoln way,
- X_{KD} : The selection of Kansas to Davenport way,
- X_{KS} : The selection of Kansas to St.Louis way,
- X_{KT} : The selection of Kansas to Tulsa way,
- X_{KW} : The selection of Kansas to Wichita way,
- X_{LD} : The selection of Lincoln to Davenport way,
- X_{LS} : The selection of Lincoln to St.Louis way,
- X_{LT} : The selection of Lincoln to Tulsa way,
- X_{LW} : The selection of Lincoln to Wichita way,
- X_{DS} : The selection of Davenport to St.Louis way,
- X_{DT} : The selection of Davenport to Tulsa way,
- X_{DW} : The selection of Davenport to Wichita way,
- X_{ST} : The selection of St.Louis to Tulsa way,
- X_{SW} : The selection of St.Louis to Wichita way,
- X_{TW} : The selection of Tulsa to Wichita way,

b. Model

MIN:

$$\begin{aligned}
 &X_{KL} * 200\$ + X_{KD} * 260\$ + X_{KS} * 75\$ + X_{KT} * 125\$ + X_{KW} * 125\$ \\
 &+ X_{LD} * 330\$ + X_{LS} * 145\$ + X_{LT} * 180\$ + X_{LW} * 100\$ + X_{DS} * 100\$ \\
 &+ X_{DT} * 300\$ + X_{DW} * 275\$ + X_{ST} * 110\$ + X_{SW} * 165\$ + X_{TW} * 180\$
 \end{aligned}$$

$$- X_{KL} - X_{KD} - X_{KS} - X_{KT} - X_{KW} = -1$$

$$X_{KL} - X_{LD} - X_{LS} - X_{LT} - X_{LW} = 0$$

$$X_{LT} + X_{KT} + X_{DT} + X_{ST} - X_{TW} = 0$$

$$X_{KW} + X_{LW} + X_{DW} + X_{SW} + X_{TW} = -1$$

$$X_{KS} + X_{LS} + X_{DS} + X_{KS} - X_{ST} - X_{SW} = 0$$

$$X_{KD} + X_{LD} - X_{DS} - X_{DT} - X_{DW} = 0$$

Note: You can see the solution of the problem in the excel sheet [g6-s6-p5.xls](#) with using solver.

