MA2210 Math. Methods in Decision Making
W. J. Martin
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MA2210 Assignment 2

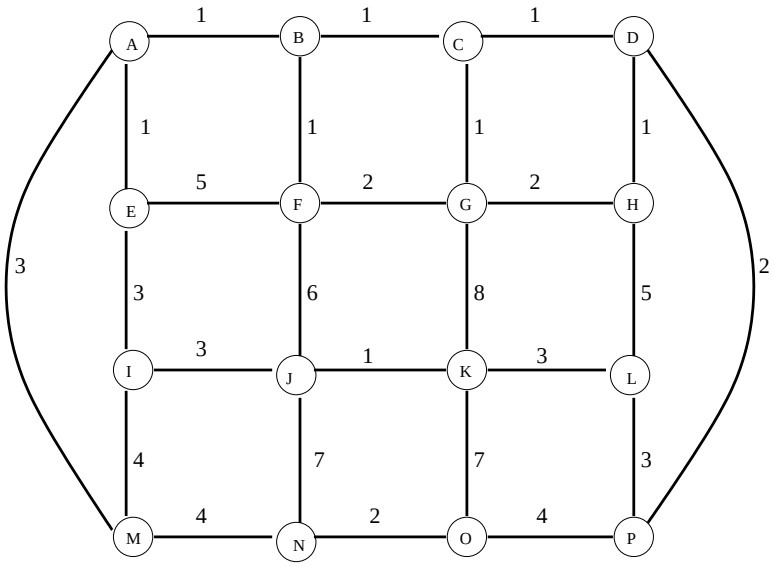
DUE DATE: Thursday, March 22, 4:00pm.

Please recall the presentation rules, repeated on the next page for your convenience.

Please complete the following five problems:

1. Consider the Tom's Inc problem discussed in class (#28 on p73). Perform the following sensitivity analysis on the optimal tableau.
   (a) Enter the LP into a solver (e.g., MAPLE or Excel) and write down the optimal tableau in the notation of our book.
   (b) Write down the optimal solution and the dual prices. Since the optimal solution does not use all available tomato sauce, the planner is willing to sell excess tomato sauce at any positive price (up to 10 lbs.)
   (c) At what price should the planner be willing to sell whole tomatoes? Up to what limit?
   (d) At what price should the planner be willing to sell tomato paste? Up to what limit?
   (e) Marketing is proposing a new more expensive jar and a fancy label. These together currenytly cost 5 cents per jar. Up to what limit on this combined cost does the current basis remain optimal? What is the change in profit for each penny increase in this combined cost?
2. Complete Exercise #14 on pages 131-2 in the text.
3. Complete Exercise #16 on pages 132-3 in the text.
4. Construct the dual LP of the following linear programming problem. Briefly explain each inequality and each variable.

$$
\begin{array}{lrcrcrcrcrcrl}
\textbf{min} & x_1 & & & & + & 23\ x_3 & - & 35\ x_4 & & & & \\
\textbf{s.t.} & & & & & & & & & & & & \\
 & 8x_1 & + & 10\ x_2 & + & 12\ x_3 & + & 14\ x_4 & \leq & 234 & & \\
 & & & 11\ x_2 & - & 21\ x_3 & & & \geq & 345 & & \\
 & 7x_1 & - & 12\ x_2 & + & 32\ x_3 & + & 42\ x_4 & = & 456 & & \\
 & x_1 & , & & x_2 & , & & x_3 & \geq & 0 & & (x_4 \text{ unrestr.})
\end{array}
$$



5. In the diagram is a network with edge costs. Find the best travelling salesman solution you can. You may use linear programming to get a lower bound, you may use trial and error, exhaustive search, whatever you like. Just submit a photocopy of the network with your optimal solution highlighted and, in big text, its total length.

   Note: A "travelling salesman solution" in a network is a set of network edges that forms a connected tour entering and leaving each node once.

BASIC RULES FOR MA2210 ASSIGNMENTS

I) Each student must compose his/her assignments independently. However, rough work may be done in groups;

II) Write legibly and use only one side of each sheet of paper;

III) Show your work. Explain your answers using FULL SENTENCES;

IV) All assignments are to be placed in the MA2210 assignment bin on Rhonda's desk in the department office.

V) No late assignments will be accepted for credit.