

620-261 Introduction to Operations Research

ASSIGNMENT 9

Post in boxes by 3.00 pm on Monday 19th May 2008

1. An electricity supplier has two generators and three clients. The capacity of each of the generators is 50 kw/day. The requirements of each of the clients is 40 kw/day. The matrix of transportation costs is given by

$$\begin{array}{c|ccc}
 c_{ij} & 1 & 2 & 3 \\
 \hline
 1 & 7 & 8 & 10 \\
 2 & 9 & 7 & 8
 \end{array}$$

If one of the clients does not receive their requirement the supplier is liable to pay a penalty. For client 1 this is \$20 for each kw, for client 2 this is \$22 for each kw and for client 3 this is \$23 for each kw.

Formulate and solve the problem of assigning transport amounts to minimise the supplier's costs.

2. Consider the LP problem whose first simplex tableau is

BV	z	x_1	x_2	x_3	x_4	x_5	x_6	x_7	b
x_5	0	2	3	3	1	1	0	0	8
x_6	0	2	1	0	4	0	1	0	10
x_7	0	3	7	3	-2	0	0	1	12
z	1	-8	-5	-1	-8	0	0	0	0

and whose final simplex tableau is

BV	z	x_1	x_2	x_3	x_4	x_5	x_6	x_7	b
x_1	0	1	$\frac{11}{6}$	2	0	$\frac{2}{3}$	$-\frac{1}{6}$	0	$\frac{11}{3}$
x_4	0	0	$-\frac{2}{3}$	-1	1	$-\frac{1}{3}$	$\frac{1}{3}$	0	$\frac{2}{3}$
x_7	0	0	$\frac{1}{6}$	-5	0	$-\frac{8}{3}$	$\frac{7}{6}$	1	$\frac{7}{3}$
z	1	0	$\frac{13}{3}$	7	0	$\frac{8}{3}$	$\frac{4}{3}$	0	$\frac{104}{3}$

- (a) In turn, determine the range of values of c_1 , c_3 , and b_1 for which the final basis does not change.
- (b) What will be the new basis if you increase the value c_3 just a bit above the upper bound found in (a)?
- (c) Use the information contained in the final tableau to determine the optimal solution (both optimal y and optimal w) to the dual problem associated with this problem.