

1C Finding an Improved Solution

To find an improved solution you need to:

Shadow costs:

For each used route from source P to destination Q:

Finding the shadow costs (steps):

1. Calculate the shadow costs given by the initial solution of the problem in Example 2 (1A question 2). The costs and the initial solution are shown below.

	W	X	Y	Z	Stock
A	180	110	130	290	14
B	190	250	150	280	16
C	240	270	190	120	20
Demand	11	15	14	10	50

	W	X	Y	Z	Stock
A	11	3			14
B		12	4		16
C			10	10	20
Demand	11	15	14	10	50

Shadow costs (write the costs of the used routes in the grid first)

	W	X	Y	Z	S(·)
A					
B					
C					
D(·)					

2. Calculate the shadow costs given by the initial solution of the problem in Example 3 (1B question 1), shown in the tables below.

	A	B	C	D	Supply
X	9	11	10	0	40
Y	10	8	12	0	60
Z	12	7	8	0	50
Demand	50	40	30	30	150

	A	B	C	D	Supply
X	40				40
Y	10	40	10		60
Z			20	30	50
Demand	50	40	30	30	150

	A	B	C	D	S(·)
X					
Y					
Z					
D(·)					

Improvement index for the route PQ:

Entering cell:

If two cells tie:

When is a solution optimal?

3. Use the shadow costs found in question 1, shown in the table below, to calculate improvement indices, and use these to identify the entering cell.

	W	X	Y	Z	S(·)
A	180	110	130	290	0
B	190	250	150	280	140
C	240	270	190	120	180
D(·)	180	110	10	-60	

Improvement indices

	W	X	Y	Z	S(·)
A					0
B					140
C					180
D(·)	180	110	10	-60	

4. The table shows a transportation problem.

	X	Y	Z	Supply
A	11	12	17	11
B	13	10	13	15
C	15	18	9	14
Demand	10	15	15	40

- a) Use the north-west corner method to find an initial solution to the transportation problem shown in the table.

	X	Y	Z	Supply
A				11
B				15
C				14
Demand	10	15	15	40

b) Find the shadow costs and improvement indices.

	X	Y	Z	S(.)
A				
B				
C				
D(.)				

	X	Y	Z	S(.)
A				
B				
C				
D(.)				

c) Hence determine whether the solution is optimal.