

Decision Sciences

Exercise Integer Programming - Less-than-Truckload Shipping problem

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Problem description

ABC is an LTL (less-than-truckload) trucking company that delivers loads on a daily basis to five customers. The following list provides the customers associated with each route:

Table: Customers served on 6 different routes

Route	Customers served on the route
1	3, 2, 4
2	5, 3, 4
3	2, 5, 1, 3
4	2, 3, 5
5	1, 4, 2
6	1, 3, 5

The segments of each route are dictated by the capacity of the truck delivering the loads. For example, on route 1, the capacity of the truck is sufficient to deliver the loads to customers 3, 2 and 4 only. The following table lists distances (in miles) among the truck terminal (ABC) and the customers.

Table: Distances

	ABC	C1	C2	C3	C4	C5
ABC	0	10	12	16	9	8
C1	10	0	32	8	17	10
C2	12	32	0	14	21	20
C3	16	8	14	0	15	18
C4	9	17	21	15	0	11
C5	8	10	20	18	11	0

- Formulate an integer program for ABC. The objective is to determine the least distance needed to make the daily deliveries to all five customers. Though the solution may result in a customer being served by more than one route, the implementation phase will use only one such route.
- Solve your model and discuss the results.