The U.S. Cable Company uses a distribution system with five distribution centers and eight customer zones. Each customer zone is assigned a sole source supplier; each customer zone receives all of its cable products from the same distribution center. In an effort to balance demand and workload at the distribution centers, the company’s vice presidents of logistics specified that distribution centers may not be assigned more than three customer zones. The following table shows the five distribution centers and cost of supplying each customer zone (in thousands of dollars)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Customer Zones |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Distribution  | Los |  |  |  |  | Kansas |  |
| Centers | Angeles | Chicago | Columbus | Atlanta | Newark | City | Denver | Dallas |
|  |  |  |  |  |  |  |  |  |
| Plano | 70 | 47 | 22 | 53 | 98 | 21 | 27 | 13 |
| Nashville | 75 | 38 | 19 | 58 | 90 | 34 | 40 | 26 |
| Flagstaff | 15 | 78 | 37 | 82 | 111 | 40 | 29 | 32 |
| Springfield | 60 | 23 | 8 | 39 | 82 | 36 | 32 | 45 |
| Bolder | 45 | 40 | 29 | 75 | 86 | 25 | 11 | 37 |

1. Determine the assignment of customer zones to distribution centers that will minimize cost
2. Which distribution centers, if any, are not used?
3. Suppose that each distribution center is limited to a maximum of two customer zones. How does this constraint change the assignment and the cost of supplying customer zones?