Homework 4:

1. A small programming firm has three senior programmers available to work on the firm’s four current projects over the next two weeks. Each programmer has 80 hours to split among the projects, and the following table shows the manager’s scoring (0=nil to 100=perfect) of the capability of each programmer to contribute to each project, along with the estimate of the hours that each project will require. The manager wants to assign programmers to maximize capability.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Project** | | | |
| **Programmer** | **1** | **2** | **3** | **4** |
| **1** | 90 | 80 | 10 | 50 |
| **2** | 60 | 70 | 50 | 65 |
| **3** | 70 | 40 | 80 | 85 |
| Required time | 70 hours | 50 hours | 85 hours | 35 hours |

1. Several forms of gasoline are produced during the petroleum refining process, and a last step combines them to obtain market products with specified quality measures. Suppose four different gasolines are available, with values for octane and sulfur given below, with corresponding costs. We would like to choose a minimum cost blend with an octane value between 85 and 90 and a sulfur value between 270 and 280.

|  |  |  |  |
| --- | --- | --- | --- |
| Gasoline | Octane | Sulfur | Cost |
| 1 | 99 | 210 | 48 |
| 2 | 70 | 335 | 43 |
| 3 | 78 | 280 | 58 |
| 4 | 91 | 265 | 46 |

1. The Clark County Sheriff's Department schedules police officers for six 8-hour shifts starting at 8 a.m., noon, 4 p.m., 8 p.m., midnight, and 4 a.m. The demand for officers varies depending on the time of day. Data analysis reflects the following:

|  |  |
| --- | --- |
| **Time of Day** | **Minimum Officers** **on Duty** |
| 8 a.m. - Noon | 5 |
| Noon - 4 p.m. | 6 |
| 4 p.m. - 8 p.m. | 10 |
| 8 p.m. - Midnight | 7 |
| Midnight to 4 a.m. | 4 |
| 4 a.m. to 8 a.m. | 6 |

The department would like to schedule officers so as to minimize cost, that is, to minimize the number of total officers needed. Find the optimal value (min number of officers), then give three optimal solutions.