**Chapters 8, and 9**

**Homework - AGEC 641**

And

1. Jake's Juice Joint purchases spe­cial­ty oranges and grapefruit and pro­ces­ses the fruit into a fruit drink. Because of competition from other pro­cessors and assembly costs, the cost of acquiring specialty oranges is

TCo = 10Qo + .01Qo2

where Qo is the number of boxes of specialty oranges purchased. Grapefruit can be purchased at $5 per box.

Two boxes of grapefruit, one box of specialty oranges, and other ingredi­ents are combined to produce 10 gallons of fruit drink. Processing costs are $2.00 per 10 gallons.

The fruit drink market is highly competitive. The total gross return from sales of the fruit drink is

TRd = 42Qd - .02Qd2

where Qd is the 10's of gallons of fruit drink sold. Processing capacity is limited to 100 gallons/day, and storage is not possible.

Use separable programming to formulate a profit maximizing LP model for JJJ.

1. Develop a formulation to fit a linear function to the data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Price of a Good |  | Quantity of that Good (own quantity) |  | Quantity of a Substitute Good |
| 3  4  2  1  7 |  | 10  9  15  22  3 |  | 12  13  9  6  15 |

where you wish to

a) Minimize Total Absolute Deviation

b) Minimize the largest Absolute Deviation

3. Perennial producers produce several crops. First and fundamentally they produce alfalfa. However, they also produce some an­nu­als and some switchgrass. They wish to establish optimal cropping plans under several assumptions. Technical data per acre follow.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Alfalfa | | | | |
| Year of Crop from Establishment |  | Labor Use | Yield | Cost |
| 1 |  | 10 | 0 | 50 |
| 2 |  | 3 | 20 | 10 |
| 3 |  | 4 | 25 | 10 |
| Switchgrass | | | | |
| Year of Crop from Establishment |  | Labor Use | Yield | Cost |
| 1 |  | 10 | 0 | 45 |
| 2 |  | 4 | 15 | 10 |
| 3 |  | 4 | 30 | 15 |
| Data for Annuals |  | Labor Use | Yield | Cost |
| SOYBEANS |  | 3 | 10 | 5 |
| SORGHUM |  | 4 | 22 | 6 |

PRICES per unit produced

Alfalfa 20

Switchgrass 15

Soybeans 5

Sorghum 3

Labor Available 2400

Land Available 600

a) Assuming an unknown life for switchgrass of 2 or 3 years, a known alfalfa life of 3 years and the firm is beginning business, model a 4‑year disequilibrium plan. If you need any other data make it up.

b) Do an equilibrium model of the situation in (a).