# Module/Week 3 Homework: Introduction to Optimization Modeling MGMT 5260: Decision-Making Techniques for Managers 

Please create a single Excel file with each problem on a separate worksheet tab.

## Problem 1

Problem 4.45(a) - Bus Company (p. 200) - No template is provided

## Problem 2

| Problem 4.78(a) - Oil Company (p. 204) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |
| Selling price per barrel |  |  |  |  |
| Input | $\begin{gathered} \mathrm{C} \\ \text { os } \\ \mathrm{t} \end{gathered}$ | Density | $\begin{aligned} & \text { Viscosit } \\ & \mathrm{y} \end{aligned}$ | Sulfur |
| Light gas oil | \$69.50 | 0.83 | 40 | 1.0 |
| Heavy gas oil | \$66.70 | 0.88 | 26 | 2.2 |
| Waxy distillate | \$56.40 | 0.92 | 30 | 2.8 |
| Atmospheric residue | \$16.50 | 0.97 | 65 | 4.1 |
| Vacuum residue | \$10.40 | 1.50 | 48 | 5.0 |
|  |  |  |  |  |
| Upper limits |  |  |  |  |
|  |  |  |  |  |
| Blending plan (1000s of barrels) |  |  |  |  |
| Input | $\begin{aligned} & \text { Input } \\ & \text { used } \\ & \hline \end{aligned}$ |  | $\begin{aligned} & \text { Availabl } \\ & \text { e } \end{aligned}$ |  |
| Light gas oil |  | <= | 40 |  |
| Heavy gas oil |  | < | 50 |  |
| Waxy distillate |  | <= | 70 |  |
| Atmospheric residue |  | <= | 60 |  |
| Vacuum residue |  | <= | 80 |  |
| Vacuum residue $\quad<=$ |  |  |  |  |
| Constraints | Density | Viscosity | Sulfur |  |
| Actual |  |  |  |  |
|  | <= | <= | <= |  |
| Maximum |  |  |  |  |
|  |  |  |  |  |
| Profit |  |  |  |  |

## Problem 3

1. Create the spreadsheet model only with the linear demand function
2. Use DataTable to calculate profits for specified prices and highlight the best profit
3. Generate a scatter diagram based on the table created in (b)

## Problem 7.45(a) - Pricing a Mustang (p. 402)

| Current demand | 250000 |
| :--- | ---: |
| Current price | $\$ 20,000$ |
| Unit cost | $\$ 16,000$ |
|  |  |
| Current elasticity | -1.5 |

Part (a): linear demand

|  |  |
| :---: | :---: |
| a |  |
| b |  |

New price
New demand

|  |  |
| :---: | :--- |
| Profit |  |
|  |  |
| Price |  |
| $\$ 21,000.00$ |  |
| $\$ 21,500.00$ |  |
| $\$ 22,000.00$ |  |
| $\$ 22,500.00$ |  |
| $\$ 23,000.00$ |  |
| $\$ 23,500.00$ |  |
| $\$ 24,000.00$ |  |
| $\$ 24,500.00$ |  |
| $\$ 25,000.00$ |  |
| $\$ 25,500.00$ |  |
| $\$ 26,000.00$ |  |
| $\$ 26,500.00$ |  |
| $\$ 27,000.00$ |  |
| $\$ 27,500.00$ |  |
| $\$ 28,000.00$ |  |
| $\$ 28,500.00$ |  |

## *OPTIONAL*

- No template will be provided for this optional, extra credit problem. Please use the problem description from page 208 of your textbook to create the spreadsheet model.
- If you provide a correct solution then you will be awarded 7 extra bonus points for this homework assignment.
- There will be no partial bonus points awarded for a partial solution. Your answer must be fully correct to receive extra credit.


## Problem 4.101 - Ingot Production at Aluminaca (p. 208)

Production data (maximum production if furnaces are devoted entirely to a particular ingot length)

| Furnace | 100 -foot | 200 -foot | 300 -foot |
| ---: | :---: | :---: | :---: |
| 1 | 230 | 340 | 350 |
| 2 | 230 | 260 | 280 |
| 3 | 240 | 300 | 310 |
| 4 | 200 | 280 | 300 |

## Cost per foot

$\square$
Decisions (how many hours on each furnace to devote to each ingot length)

| Furnace | 100-foot | 200-foot | 300-foot | Sum |  | Available |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 |  |  |  |  | <= |  |
| 2 |  |  |  |  | <= |  |
| 3 |  |  |  |  | <= |  |
| 4 |  |  |  |  | <= |  |
|  |  |  |  |  |  |  |
| Ingots produced |  |  |  |  |  |  |
| Furnace | 100-foot | 200-foot | 300-foot |  |  |  |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| Total |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Demand constra |  |  |  |  |  |  |
|  | 100-foot | 200-foot | 300-foot |  |  |  |
| Available |  |  |  |  |  |  |
|  | >= | >= | >= |  |  |  |
| Demand | 700 | 300 | 150 |  |  |  |
|  |  |  |  |  |  |  |
| Total cost |  |  |  |  |  |  |

