Mathematical Modeling Solutions

December 28, 2015

1 Furniture Company

Let x, y, z be the number of tables, chairs, and desks that you decide to produce respectively.

$$\begin{aligned} \max \quad & 60x + 40y + 100z \\ \text{s.t.} \quad & 6x + 2y + 5z \leq 500 \\ & 2x + 2y + 3z \leq 300 \\ & 4x + 2y + 6z \leq 450 \\ & x, y, z \geq 0 \\ & x, y, z \text{ integer} \end{aligned} \tag{1}$$

2 New England Power

Let AW, BW, CW, DW be the amounts of gigawatts supplied to Western Massachusetts from power plants A, B, C, D respectively, and let AE, BE, CE, DE be the amounts of gigawatts supplied to Eastern Massachusetts from power plants A, B, C, D respectively.

$$
\begin{aligned}
\min \quad & 2200AE + 2200BE + 4000CE + 2300DE + 2800AW + 2200BW + 3000CW + 3100DW \\
\text{s.t.} \quad & AE + BE + CE + DE \geq 900,000 \\
& AW + BW + CW + DW \geq 700,000 \\
& AW + AE \leq 800,000 \\
& BW + BE \leq 400,000 \\
& CW + CE \leq 600,000 \\
& DW + DE \leq 350,000 \\
& AW + AE \leq \tfrac{1}{4}(AE + BE + CE + DE + AW + BW + CW + DW) \\
& AE, BE, CE, DE, AW, BW, CW, DW \geq 0
\end{aligned}
\tag{2}
$$