Homework 6
Due 2/15

1. Solve the Farmer Jones problem (without government) USING GAMS, include the GAMS output file.

$$\begin{aligned}
\max \quad z =& (3)(10)x_1 + (4)(25)x_2 + 0x_3 + 0x_4 + 0x_5 && (1)\\
& \text{subject to} \\
& x_1 + x_2 + x_3 = 7 \qquad \text{Acres} && (2)\\
& 4x_1 + 10x_2 + x_4 = 40 \qquad \text{Labor} && (3)\\
& x_i \geq 0 \qquad \forall i = 1, 2, 3, 4, 5 && (4)
\end{aligned}$$

2. What does the price of corn need to be for it to enter the basis?
3. How much does your income change if you get 10 extra labor hours?
4. How much does your income change if you lose 2 acres?
5. Suppose Farmer Jones wants to think about growing soy beans. Each acre of soy beans yields 20 bushels, and each bushel sells for \$3. What is the most amount of labor it can take to farm an acre of soy beans for Farmer Jones to grow them?
6. Suppose it only takes 3 hours to farm an acre of corn, how does this affect your optimal solution?
7. Consider the following LP:

$$\begin{aligned}
\max \quad z =& 5x_1 + 3x_2 + 4x_3 && (5)\\
& \text{subject to} \\
& x_1 + \frac{3}{2}x_2 + x_3 \leq 4 && (6)\\
& 2x_1 + x_2 + \frac{3}{2}x_3 \leq 5 && (7)\\
& x_i \geq 0 \qquad \forall i = 1, 2, 3 && (8)
\end{aligned}$$

For each of the following choices of Basis, determine if it is optimal or not. State why. $\begin{bmatrix} x_1 \\ x_5 \end{bmatrix}$, $\begin{bmatrix} x_3 \\ x_2 \end{bmatrix}$, $\begin{bmatrix} x_3 \\ x_4 \end{bmatrix}$