QUIZ September 18, 2013

1. Suppose the chemicals C_3H_8 and O_2 combine to form CO_2 and H_2O in an equation of the form

$$(x_1)CH_4 + (x_2)O_2 \rightarrow (x_3)CO_2 + (x_4)H_2O$$
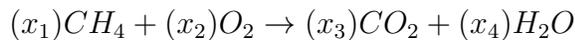
To solve for the correct values of the x_i, we must solve the system

$$\begin{bmatrix} 1 & 0 & -1 & 0 \\ 4 & 0 & 0 & -2 \\ 0 & 2 & -2 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

2. Suppose an economy has two sectors, Bread and Circuses, and we wish to find their output prices, p_B and p_C. Suppose that Bread sells all its output to Circuses, and Circuses sells half its output to itself and half to Bread. Then we must solve the system

$$\begin{bmatrix} 1 & -.5 \\ -1 & .5 \end{bmatrix} \begin{bmatrix} p_B \\ p_C \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

3. A small change in the coefficients of a linear system can lead to a large change in the solutions of the system.

1