QUIZ September 30, 2013

Clicker Instructions: A = True; B = False;
C = I don't know; D = No truth value
correct = 1pt; don't know = 0pt; wrong = -1pt

1. Suppose you wish to create hamster burgers with just the right amoung of protein, fat and bones. In 100 grams of hamster, 80 are protein, 10 are fat and 10 are bones. In 100 grams of squid, 20 are protein, 80 are fat and 0 are bones. In 100 grams of bones, 0 are protein, 0 are fat, and 100 are bones. Market research implies the public wants a hamsterpatty that is 30% protein, 30% fat and 40% bones. The percentage of each of the three ingredients you need is $x_1, x_2, x_3$, where

$$x_1 \begin{pmatrix} 80 \\ 10 \\ 10 \end{pmatrix} + x_2 \begin{pmatrix} 20 \\ 80 \\ 0 \end{pmatrix} + x_3 \begin{pmatrix} 0 \\ 0 \\ 100 \end{pmatrix} = \begin{pmatrix} 30 \\ 30 \\ 40 \end{pmatrix}$$

.

2. Suppose you have the electrical network drawn on the board. Using the currents $I_1$ and $I_2$ as variables, the augmented matrix representing this system is

$$\left[\begin{array}{cc|c} 5 & -3 & 10 \\ -3 & 3 & 5 \end{array}\right]$$

3. Each year, 10% of good students at CU turn bad (due to weed, snowboarding or puff pastries), and 5% of bad students turn good (due to taking linear algebra). A migration matrix for this situation, acting on vectors

$$\begin{pmatrix} \text{number of good students} \\ \text{number of bad students} \end{pmatrix}$$

is

$$\begin{bmatrix} .95 & .05 \\ .9 & .1 \end{bmatrix}.$$