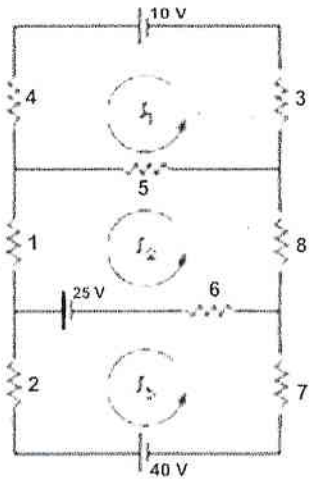
Math 2568, Quiz #4, Summer 2013 Name KEY

Instructions: Show all work. Give exact answers unless specifically told to round.

1. Solve the electrical circuit problem shown below. You must show the system of equations used to obtain the solution. Round your answers to two decimal places. The resistors are all in ohms.



$12I_1 - 5I_2 = 10$

$-5I_1 + 20I_2 - 6I_3 = -25$

$-6I_2 + 15I_3 = -40 + 25 = -15$

$\vec{I} = \begin{bmatrix} 15/133 \\ -230/133 \\ -225/133 \end{bmatrix} \approx \begin{bmatrix} .113 \\ -1.73 \\ -1.69 \end{bmatrix}$

2. For the given matrices, $A = \begin{bmatrix} 2 & 1 \\ 1 & -1 \end{bmatrix}, B = \begin{bmatrix} 3 & -4 \\ 0 & 1 \\ 6 & -2 \end{bmatrix}, C = \begin{bmatrix} 5 \\ 1 \\ -8 \end{bmatrix}$, determine which of the following products are defined. Choose **one** of them to compute.

a. AB $(2\times2)\times(3\times2)$ undefined

b. BA $(3\times2)\times(2\times2) = \begin{bmatrix} 2 & 7 \\ 1 & -1 \\ 10 & 8 \end{bmatrix}$

c. AC $(2\times2)\times(3\times1)$ undefined

d. BC $(3\times2)\times(3\times1)$ undefined

e. CB $(3\times1)\times(3\times2)$ undefined

3. Use an inverse matrix to solve the system $\begin{cases} 8x_1 + 6x_2 = 2 \\ 5x_1 - 2x_2 = 1 \end{cases}$

$A = \begin{bmatrix} 8 & 6 \\ 5 & -2 \end{bmatrix} \quad A^{-1} = \begin{bmatrix} 1/23 & 3/23 \\ 5/23 & -4/23 \end{bmatrix}$

$A^{-1}\vec{b} = \begin{bmatrix} 1/23 & 3/23 \\ 5/23 & -4/23 \end{bmatrix}\begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 5/23 \\ 1/23 \end{bmatrix} = \vec{x}$