ECH3301 Process Analysis and Design Spring 2012
Quiz 2   Solutions

1. We have $A\mathbf{u} = \mathbf{b}$, where

$$A = \begin{bmatrix} 0.8 & 1.2 & -0.6 \\ 2.6 & 0 & 1.7 \\ 4 & -7.3 & -1.5 \end{bmatrix}, \quad \mathbf{u} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \quad \text{and} \quad \mathbf{b} = \begin{bmatrix} -7.8 \\ 15.3 \\ 1.1 \end{bmatrix}.$$

   Using Gaussian elimination with rescaling and/or partial pivoting yields the exact solution

$$\mathbf{u} = \begin{bmatrix} 0 \\ -2 \\ 9 \end{bmatrix}.$$

2. (1) Recalling that the inverse of $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is $A^{-1} = \frac{1}{\det A} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$, we may conclude that the inverse of

$$A = \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$$

   is

$$A^{-1} = \frac{1}{10} \begin{bmatrix} 4 & -1 \\ -2 & 3 \end{bmatrix}.$$

   (2) The inverse of

$$A = \begin{bmatrix} 3 & -1 & 1 \\ 15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$$

   is

$$A^{-1} = \begin{bmatrix} 2 & 0 & 1 \\ -55 & 1 & 30 \\ -60 & 1 & 33 \end{bmatrix}.$$