Answer key for the October, 2005 midterm for MATH1300

1. a) F, b)T, c) F, d) F, e) F, f) T, g) T, h) T .

2. a) $\begin{bmatrix} 1 & 0 & 2 & 0 & 4 \\ 0 & 1 & 3 & 0 & 5 \\ 0 & 0 & 0 & 1 & 6 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$.

   b) $x_1=4-2t$, $x_2=5-3t$, $x_3=t$, $x_4=6$, with t in $\mathbb{R}$.

3. a) $\begin{bmatrix} 1 & -3 & 4 \\ 6 & -6 & 2 \end{bmatrix}$

   b) Not possible: CD is 3X3, but AB is 2X2.

   c) –4.

4. a) $E_1 = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$, $E_2 = \begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix}$.

   b) $E_1^{-1} = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$, $E_2^{-1} = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}$.

   c) $A = E_1^{-1} E_2^{-1}$.

5. a) –14, b) Yes, since its determinant is –14.

6. a) k not equal to –2.

   b) $A^{-1} = \begin{bmatrix} 1 & -1/2 & 0 \\ 0 & -1/4 & 1/2 \\ 0 & 1/4 & 1/2 \end{bmatrix}$.

   c) x=1, y=1, z=3.

7. a) $C_{23} = 2$, $C_{22} = 5$.

   b) $\det(B) = 4$, $\text{adj}(B) = \begin{bmatrix} 1 & -4 \\ 1/2 & 2 \end{bmatrix}$.