MATH 54 – QUIZ 5

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Name:_____

Instructions: You have 10 minutes to take this quiz, for a total of 10 points. May your luck have maximal rank!

1. *(5 points)* For the following matrix A, find:

   (a) A basis for $Row(A)$
   (b) A basis for $Col(A)$
   (c) $Rank(A)$
   (d) $\dim Nul(A)$ (justify)

$$A = \begin{bmatrix} 1 & 1 & -3 & 7 & 9 & -9 \\ 1 & 2 & -4 & 10 & 13 & -12 \\ 1 & -1 & -1 & 1 & 1 & -3 \\ 1 & -3 & 1 & -5 & -7 & 3 \\ 1 & -2 & 0 & 0 & -5 & -4 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & -3 & 7 & 9 & -9 \\ 0 & 1 & -1 & 3 & 4 & -3 \\ 0 & 0 & 0 & 1 & -1 & -2 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

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2. *(5 points)* Let $\mathcal{A} = \left\{ \begin{bmatrix} -1 \\ 8 \end{bmatrix}, \begin{bmatrix} 1 \\ -7 \end{bmatrix} \right\}$ and $\mathcal{D} = \left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \end{bmatrix} \right\}$.

Use a **change-of-coordinates matrix** to find $[\mathbf{x}]_{\mathcal{A}}$ given

$$[\mathbf{x}]_{\mathcal{D}} = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$$