Quiz 5; Tuesday, October 4
MATH 54 with Ming Gu
GSI: Eric Hallman

Student name:

You have 15 minutes to complete the quiz. Calculators are not permitted.

1. (4 points) If $\mathcal{B} = \{\mathbf{b}_1, \mathbf{b}_2\} = \left\{ \begin{bmatrix} 4 \\ 4 \end{bmatrix}, \begin{bmatrix} 8 \\ 4 \end{bmatrix} \right\}$ and $\mathcal{C} = \{\mathbf{c}_1, \mathbf{c}_2\} = \left\{ \begin{bmatrix} 2 \\ 2 \end{bmatrix}, \begin{bmatrix} -2 \\ 2 \end{bmatrix} \right\}$ find the change-of-coordinates matrix from $\mathcal{B}$ to $\mathcal{C}$ and from $\mathcal{C}$ to $\mathcal{B}$. Be sure to specify which is which. (Hint: once you have found one it should not be too hard to find the other.)

2. (4 points) Given that $\lambda = 4$ is an eigenvalue of $\begin{bmatrix} 3 & 0 & -1 \\ 2 & 3 & 1 \\ -3 & 4 & 5 \end{bmatrix}$, find one corresponding eigenvector.

3. (4 points) Mark each statement as True or False. You do not have to explain your reasoning.

   (a) If the null space of an 8×7 matrix A is 5-dimensional, then the row space of A must be 3-dimensional.

   (b) The row space of A^T is the same as the column space of A.

   (c) If $A\mathbf{x} = \lambda\mathbf{x}$ for some vector $\mathbf{x}$, then λ is an eigenvalue of A.

   (d) If two matrices A and B are row equivalent then they have the same eigenvalues.