Printed Name _____ Signature _____

Linear Algebra
Quiz #4

Show your work and clearly label your answers on this quiz.

No scrap paper or notes are allowed, but you may use a scientific or accounting calculator (no phones or computers). Use 6 digits of precision throughout your calculations (and answers), although fractions and roots will likely make for more intelligible answers.

This quiz is scored out of 50 points. (There are 60 points possible.)

You have 30 minutes to complete the quiz.

To get credit on a problem, you *must* give a clear, well-written explanation, justifying each step.

Linear Algebra
Quiz #4

A plane in $\mathbb{R}^4$ is spanned by the two vectors

$$\begin{pmatrix}1\\1\\0\\2\end{pmatrix} \text{ and } \begin{pmatrix}0\\0\\1\\0\end{pmatrix}.$$

A is the matrix whose columns are these vectors.

Problem 1 (20 pts)
Give the projection matrix P that projects a vector $b \in \mathbb{R}^4$ onto this plane.

Problem 2 (10x4 pts)
What are the best fit solution, error, and projection vectors for the system $A\vec{x} = b$, where

$$b = \begin{pmatrix} 2 \\ 5 \\ 2 \\ 8 \end{pmatrix} ?$$

Verify that the error and projection vectors e and p exist in the correct subspaces generated by A, and that they are orthogonal.