This quiz has two problems worth 10 points.

1. (3 points) Let $A = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 1 & 3 \\ 3 & 0 & 8 \end{bmatrix}$ and $\mathbf{x} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$. Write the matrix $\cdot$ vector product $A\mathbf{x}$ as:

   (a) a linear combination of the columns of A

   (b) a single vector

   (c) as dot products of rows of A

2. (7 points) Let $\mathbf{v} = \begin{bmatrix} 1 \\ 2 \\ 2 \end{bmatrix}$ and $\mathbf{w} = \begin{bmatrix} -4 \\ 1 \\ -2 \end{bmatrix}$

   (a) Is the angle between $\mathbf{v}$ and $\mathbf{w}$ acute, right, or obtuse? Explain your answer. (Note you were not asked to find the angle.)

   (b) Find a **nonzero** vector that is perpendicular to $\mathbf{v}$ and show that you are correct.

   (c) Find a **unit** vector $\mathbf{u}$ in the same direction as vector $\mathbf{v}$.

   (d) Find a vector $\mathbf{a}$ such that the set of vectors $\mathbf{v}$, $\mathbf{w}$, and $\mathbf{a}$ are **dependent**.