You have 20 minutes to complete the quiz.

1. (4 points) Find the value(s) of h for which the following set of vectors in linearly *dependent*

$$\left\{\begin{bmatrix}3\\-6\\1\end{bmatrix}, \begin{bmatrix}-6\\4\\-3\end{bmatrix}, \begin{bmatrix}9\\h\\3\end{bmatrix}\right\}$$

$$x_1\begin{bmatrix}3\\-6\\1\end{bmatrix} + x_2\begin{bmatrix}-6\\4\\-3\end{bmatrix} = \begin{bmatrix}9\\h\\3\end{bmatrix} \Rightarrow \begin{bmatrix}3 & -6 & 9\\-6 & 4 & h\\1 & -3 & 3\end{bmatrix}$$

$$\sim \begin{bmatrix}1 & -3 & 3\\-6 & 4 & h\\0 & 9 & 0\end{bmatrix} \sim \begin{bmatrix}1 & -3 & 3\\0 & 9 & 0\\0 & -14(h+18)\end{bmatrix}$$

~~has 2 solutions~~

The set is only linearly dependent if $h = -18$.

2. (2 points) *True or false.* If $\{v_1, v_2, v_3, v_4\}$ is a linearly independent set of vectors in $\mathbb{R}^4$, then $\{v_1, v_2, v_3\}$ is also linearly independent.

True. If $c_1v_1 + c_2v_2 + c_3v_3 + c_4v_4 = 0$ has only one solution, then so does $c_1v_1 + c_2v_2 + c_3v_3 = 0$

3. (4 points) Produce a matrix corresponding to the following linear transformation.

$$T : \mathbb{R}^2 \to \mathbb{R}^2$$

T rotates a vector by $\pi/4$, and then reflects it across the x_2 axis.

$$T\left(\begin{bmatrix}1\\0\end{bmatrix}\right) = \begin{bmatrix}-\frac{\sqrt{2}}{2}\\\frac{\sqrt{2}}{2}\end{bmatrix}$$

$$T\left(\begin{bmatrix}0\\1\end{bmatrix}\right) = \begin{bmatrix}\frac{\sqrt{2}}{2}\\\frac{\sqrt{2}}{2}\end{bmatrix}$$

$$\Rightarrow A = \begin{bmatrix}-\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2}\\\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2}\end{bmatrix}$$