Your Name:

1. Compute the determinant of this matrix.

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 5 & 7 & 9 & 11 & 1 \\ 2 & 4 & 6 & 8 & 10 & 12 \\ 1 & 4 & 3 & 5 & 4 & 0 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 9 \end{pmatrix}$$

2. Find the eigenvalues and eigenvectors of this matrix.

$$\begin{pmatrix} 1 & 2 \\ 3 & 2 \end{pmatrix}$$

3. Prove that this function is a linear transformation from $\mathbb{R}^3$ to $\mathbb{R}^3$.

$$T\left(\begin{pmatrix} x \\ y \\ z \end{pmatrix}\right) = \begin{pmatrix} x+y \\ x-y \\ 0 \end{pmatrix}$$

4. Prove that this linear transformation is injective, with domain $\mathbb{R}^2$.

$$T\left(\begin{pmatrix} x \\ y \end{pmatrix}\right) = \begin{pmatrix} x \\ y \\ x+y \end{pmatrix}$$

5. Prove that this linear transformation is surjective, with codomain $\mathbb{R}^2$.

$$T\left(\begin{pmatrix} x \\ y \\ z \end{pmatrix}\right) = \begin{pmatrix} y+z \\ x+y \end{pmatrix}$$

6. Prove that this linear transformation is invertible.

$$T\left(\begin{pmatrix} x \\ y \\ z \end{pmatrix}\right) = \begin{pmatrix} x+y+z \\ 2x \\ 3z \end{pmatrix}$$