1. Find the eigenvalues and eigenspaces for \( A = \begin{bmatrix} 2 & 1 \\ 0 & 2 \end{bmatrix} \) and \( B = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix} \).

2. Find the eigenvalues and eigenspaces of \( A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 2 & 1 \\ 0 & 0 & 3 \end{bmatrix} \).

3. Consider the following model of employment numbers. We follow a large group of potential workers for 10 years, and assume that none of them die in that time.

Let \( x_0 \) be the percentage of our group who are **employed** on Jan 1, 2020.

Let \( y_0 \) be the percentage who are **unemployed** on Jan 1, 2020.

Let \( p_0 = \begin{bmatrix} x_0 \\ y_0 \end{bmatrix} \) be the initial vector of percentages.

We predict that each year, \(1/2\) of the unemployed folks find a job, and \(1/10\) of the unemployed folks lose their job. Let \( A = \begin{bmatrix} .9 & .5 \\ .1 & .5 \end{bmatrix} \) Then \( p_1 = Ap_0 \) predicts the percentages of employed and unemployed people on Jan 1, 2021, and \( p_2 = Ap_1 \) predicts the percentages on Jan 1, 2022, and so on.

(a) Show that \(2/5\) and \(1\) are eigenvalues for \( A \), and find their eigenvectors.

(b) Suppose the initial percentages are given by \( p_0 = \begin{bmatrix} 66.667 \\ 33.333 \end{bmatrix} \). After 10 years, approximately what does this model predict for the percentages of employed and unemployed workers?