

1. Compute the determinant and the eigenvalues of

$$A = \begin{pmatrix} 2 & 3 \\ 0 & -1 \end{pmatrix} \quad B = \begin{pmatrix} 3 & 0 & 0 \\ 5 & 2 & 0 \\ 11 & 27 & -4 \end{pmatrix}$$

What do you notice? Can you generalize?

2. Compute the determinant and eigenvalues of

$$A = \begin{pmatrix} 1 & -2 \\ -3 & 6 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ -1 & 1 & 0 \end{pmatrix}$$

What do you notice? Can you generalize?

3. Consider the matrix A and its powers:

$$A = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix} \quad A^2 = \begin{pmatrix} 5 & -4 \\ -4 & 5 \end{pmatrix} \quad A^3 = \begin{pmatrix} 14 & -13 \\ -13 & 14 \end{pmatrix}$$

Find the eigenvectors for A . What effect does A^2 have on the eigenvectors for A ? How about A^3 ? Can you generalize?

4. (*Revised*) Find the eigenvalues of the following matrices:

$$A = \begin{pmatrix} 3 & 2 \\ -1 & 2 \end{pmatrix} \quad A^{-1} = \begin{pmatrix} \frac{1}{2} & -\frac{1}{2} \\ -\frac{1}{4} & \frac{3}{4} \end{pmatrix} \quad B = \begin{pmatrix} 4 & -5 \\ -10 & -1 \end{pmatrix} \quad B^{-1} = \begin{pmatrix} \frac{1}{54} & -\frac{5}{54} \\ -\frac{5}{27} & -\frac{2}{27} \end{pmatrix}$$

What do you notice? Can you generalize?

5. *Previous version of 4* Find the eigenvalues of the following matrices:

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \quad A^{-1} = \begin{pmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{pmatrix} \quad B = \begin{pmatrix} 1 & -1 \\ 2 & 2 \end{pmatrix} \quad B^{-1} = \begin{pmatrix} \frac{1}{2} & \frac{1}{4} \\ -\frac{1}{2} & \frac{1}{4} \end{pmatrix}$$

What do you notice? Can you generalize?