$$\cancel{A}^{B} := \begin{pmatrix} 3 & -1 \\ -1 & 3 \end{pmatrix} - \begin{pmatrix} \lambda & 0 \\ 0 & \lambda \end{pmatrix} = \begin{pmatrix} 3-\lambda & -1 \\ -1 & 3-\lambda \end{pmatrix} = A - \lambda I$$

$\lambda = 2$

$$\det \begin{pmatrix} a & b \\ c & d \end{pmatrix} = ad - bc$$

$$\det \cancel{A}^{B} = 9 - 6\lambda + \lambda^2 - 1 = 0$$

$$\lambda^2 - 6\lambda + 8 \qquad \lambda_{1,2} = \frac{6 \pm \sqrt{36 - 4 \cdot 8}}{2}$$

$$\cancel{= 1 \pm \sqrt{}}$$

$$= 3 \pm 1 = \begin{cases} 4 \\ 2 \end{cases}$$

Find λ: $\overbrace{[A - \lambda I]}^{B}$ is <u>not</u> of full rank

Then there exists $x \neq 0$: $(A - \lambda I)x = 0$

~~characteristic polynomial~~

apply k times

$$A^k v_i = A^{k-1} \lambda_i v_i = \lambda_i^k v_i$$

ith eigenvector

$$x = \sum_{i=1}^{n} \alpha_j v_j = \alpha V$$

$$A^k x = A^{k-1} A x = A^{k-1} \sum \alpha_j \overbrace{A v_j}^{\lambda_j v_j} = A^{k-1} \left(\alpha_1 \lambda_1 v_1 + \sum_{2}^{n} \alpha_j \lambda_j v_j \right)$$

$$= \lambda_1^k \left(\alpha_1 v_1 + \sum_{j=2}^{n} \alpha_j \left(\frac{\lambda_j}{\lambda_1} \right)^k v_j \right)$$

$$\lim_{k \nearrow \infty} A^k x = \lambda_1^k \alpha_1 v_1 \quad \text{of } |\lambda_1| > |\lambda_j| \; j > 1 \qquad (A - \lambda_1 I)$$