

$$A = \begin{bmatrix} 1 & -1 & 0 \\ -2 & 4 & -2 \\ 0 & -1 & 2 \end{bmatrix} \quad x_0 = x^{(0)} = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}$$

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$$x_0^T = [-1 \quad 2 \quad 1] \quad Ax_0 = \begin{bmatrix} 1 & -1 & 0 \\ -2 & 4 & -2 \\ 0 & -1 & 2 \end{bmatrix} \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} -3 \\ 8 \\ 0 \end{bmatrix}$$

$$x_0^T Ax_0 = [-1 \quad 2 \quad 1] \begin{bmatrix} -3 \\ 8 \\ 0 \end{bmatrix} = 19$$

$$x_0^T x_0 = [-1 \quad 2 \quad 1] \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix} = 6$$

$$\mu = (x_0^T Ax_0) / (x_0^T x_0) = \underline{19/6}$$

$$A - \mu I = \begin{bmatrix} 1 & -1 & 0 \\ -2 & 4 & -2 \\ 0 & -1 & 2 \end{bmatrix} - \begin{bmatrix} 19/6 & 0 & 0 \\ 0 & 19/6 & 0 \\ 0 & 0 & 19/6 \end{bmatrix} = \begin{bmatrix} -2.1667 & -1 & 0 \\ -2 & 0.8333 & -2 \\ 0 & -1 & -1.6667 \end{bmatrix}$$

$$(A - \mu I)^{-1} = \begin{bmatrix} -0.3388 & -0.1330 & 0.2280 \\ -0.2660 & 0.2881 & -0.4939 \\ 0.2280 & -0.2470 & -0.4338 \end{bmatrix}$$

$$y^{(1)} = (A - \mu I)^{-1} x^{(0)} = \begin{bmatrix} -0.3388 & -0.1330 & 0.2280 \\ -0.2660 & 0.2881 & -0.4939 \\ 0.2280 & -0.2470 & -0.4338 \end{bmatrix} \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 0.3008 \\ 0.3483 \\ -1.1557 \end{bmatrix}$$

$$x^{(1)} = \frac{y^{(1)}}{\|y^{(1)}\|} = \begin{bmatrix} 0.2418 \\ 0.2800 \\ -0.9291 \end{bmatrix} = \begin{bmatrix} -0.2603 \\ -0.3013 \\ 1 \end{bmatrix}$$

$$y^{(1)} = (A - \mu I)^{-1} x^{(1)} = \begin{bmatrix} -0.3388 & -0.1330 & 0.2280 \\ -0.2660 & 0.2881 & -0.4939 \\ 0.2280 & -0.2470 & -0.4338 \end{bmatrix} \begin{bmatrix} -0.2603 \\ -0.3013 \\ 1 \end{bmatrix} = \begin{bmatrix} 0.3563 \\ -0.5115 \\ -0.4187 \end{bmatrix}$$

$$x^{(2)} = \frac{y^{(1)}}{\|y^{(1)}\|} = \begin{bmatrix} 0.4744 \\ -0.6812 \\ -0.5576 \end{bmatrix} = \begin{bmatrix} -0.6965 \\ 1.0000 \\ 0.8186 \end{bmatrix}$$

$$y^{(2)} = (A - \mu I)^{-1} x^{(2)} = \begin{bmatrix} -0.3388 & -0.1330 & 0.2280 \\ -0.2660 & 0.2881 & -0.4939 \\ 0.2280 & -0.2470 & -0.4338 \end{bmatrix} \begin{bmatrix} -0.6965 \\ 1.0000 \\ 0.8186 \end{bmatrix} = \begin{bmatrix} 0.2896 \\ 0.0691 \\ -0.7609 \end{bmatrix}$$

$$x^{(3)} = \frac{y^{(2)}}{\|y^{(2)}\|} = \frac{1}{\sqrt{0.2896^2 + 0.0691^2 + (-0.7609)^2}} \begin{bmatrix} 0.2896 \\ 0.0691 \\ -0.7609 \end{bmatrix} = \begin{bmatrix} 0.3544 \\ 0.0845 \\ -0.9312 \end{bmatrix} = \begin{bmatrix} -0.3806 \\ -0.0908 \\ 1.0000 \end{bmatrix}$$

eigenvalue:  $\lambda \approx (Ax^{(3)})_3 = 2.0908$

$$(A - \lambda^{(3)}) x^{(3)} = \begin{bmatrix} -1.3951 \\ -2.7071 \\ 0.9855 \end{bmatrix} = r_{\text{res}}$$

$$\text{norm}(r_{\text{res}}) = 3.2009$$

↑  
error  
(still big)

