Worksheet 7 Numerical Analysis Spring 2023

Name: _____ NetID: | | | | | | | | | | |

Name: _____ NetID: | | | | | | | | | | |

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Work in groups of at least 2 and at most 4.

Suppose $\mathbf{A}$ has SVD:

$$\mathbf{A} = \begin{bmatrix} \frac{1}{2} & -\frac{5}{2} \\ -\frac{5}{2} & \frac{1}{2} \end{bmatrix} = \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{bmatrix} \begin{bmatrix} 3 & \\ & 2 \end{bmatrix} \begin{bmatrix} \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \end{bmatrix}^{\mathsf{T}} = \mathbf{U}\mathbf{\Sigma}\mathbf{V}^{\mathsf{T}}$$

Find the eigenvalue decomposition of $\mathbf{A}$.

Suppose $\mathbf{A}$ is $n \times n$ and $\mathbf{A}\mathbf{v}_i = \lambda_i \mathbf{v}_i$. Write this as a matrix equation. Hint: start by forming a matrix equality where each column of the equality is the i-the equality written above.