QUIZ REVIEW.

1. Compute the singular values of the following matrix:

$$A = \begin{bmatrix} 4 & -2 \\ 2 & -1 \\ 0 & 0 \end{bmatrix}$$

2. Compute the eigenvalues and singular values for the following matrices:

i. $\begin{bmatrix} 2 & 2 \\ 0 & 1 \end{bmatrix}$ ii. $\begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$ iii. $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

3. Determine whether the following statements are true or false:

i. Let A be an $n \times n$ matrix. If A is orthogonally diagonalizable, then A is symmetric.

ii. If A is a symmetric $n \times n$ matrix, then $\langle u, v \rangle = u^T A v$ is an inner product.

iii. For any real matrix A, the SVD of A exists and is unique.

4. Solve for the general solution to the following differential equation.

$$y''(t) - y'(t) - 2y(t) = e^t$$

5. Solve the following initial value problem,

$$y''(t) - y'(t) - 6y(t) = 0, \quad y(0) = 1, \quad y'(0) = 3$$

6. Determine whether the following statements are true or false.

i. Let $y_1(t)$ be a solution of $y''(t)+3y'(t)=0$, then $3y_1(t)$ is also a solution.

ii The particular solution to the differential equation $y''-3y'-4y=te^t$ has the form $(A_1t+A_0)e^t$ $(A_0, A_1 \in \mathbb{R})$.

iii. The differential equation $y'''+y''-2y'+y=0$ has 3 linearly independent solutions.