Quiz03: Singular Value Decomposition

1. Find the SVD of the following matrix:

$$A = \begin{bmatrix} 3 & 2 & 2 \\ 2 & 3 & -2 \end{bmatrix}$$

$$B = \begin{bmatrix} 2 & 2 \\ -1 & 1 \end{bmatrix}$$

2. Using the matrix

$$P = \begin{bmatrix} 25 & 2 & -5 \\ 3 & -2 & 1 \\ 5 & 7 & 4 \end{bmatrix}$$

   from the proceeding PyTorch exercises, demonstrate that these three SVD-eigendecomposition equations are true.

3. Use the $torch.svd()$ method to calculate the pseudoinverse of Ap, confirming that your results matches the output of $torch.pinverse(A_p)$

4. With the A_p provided below:

$$A = \begin{bmatrix} -1 & 2 \\ 3 & -2 \\ 5 & 7 \end{bmatrix}$$

   (a) Use the PyTorch trace method to calculate the trace of A_p

   (b) Use the PyTorch Frobenius norm method and the trace method to demonstrate that $\|A\|_F = \sqrt{Tr(AA^T}$.