Linear Algebra and its Applications

HW#13

NOTE:

- No need to submit HW#13
- You may discuss the problems with TA during the office hours
- Close-book final exam: 2:20~5:30pm 12/ 19 (Tuesday). No electronic calculators are allowed.

1. Find the SVD of $\boldsymbol{A}$ if $\boldsymbol{A}$ has orthogonal columns $w_1,...,w_n$ of lengths $\sigma_1,...,\sigma_n$.

2. Find the singular value decomposition and the pseudo-inverse of

$$A=\begin{bmatrix}1 & 1 & 1 & 1\end{bmatrix} \quad B=\begin{bmatrix}0 & 1 & 0\\ 1 & 0 & 0\end{bmatrix} \text{ and } C=\begin{bmatrix}1 & 1\\ 0 & 0\end{bmatrix}$$

3. Compute the polar decomposition $A=QS$.

$$A=\frac{1}{\sqrt{10}}\begin{bmatrix}10 & 6\\ 0 & 8\end{bmatrix}$$

Knowing Q, find the reverse form $A=S'Q$.

4. Show from *SVD* that $A^{+}=A^{\mathrm{T}}(AA^{\mathrm{T}})^{-1}$ when AA^{T} is positive definite.