

Homework 4. Due Thursday Nov. 4.

1. **(10 pts)** Prove the Eckart-Young-Mirsky theorem for any Ky-Fan norm, i.e., if $A = U\Sigma V^T$ is the SVD of A , and M is any matrix of the size of A such that $\text{rank}(M) \leq k$, then

$$\|A - M\| \geq \|A - U_k \Sigma_k V_k^T\| \quad \text{for any Ky-Fan norm } \|\cdot\|.$$

Hint: You might find helpful the paper by A. Dax “From Eigenvalues to Singular Values: A Review”.