

# Homework

## Exercise 1:

*Let  $A, B \in M_n$ .*

- 3. If  $A, B$  are Hermitian then  $aA + bB$  is Hermitian*
- 4.  $A - A^*$  is skew-Hermitian for all  $A \in M_n$ .*

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**Exercise 2.** The real symmetric matrix  $M = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$

is positive definite? is positive semi-definite? is negative definite? is negative semi-definite?

**Exercise 3.** *Let  $A, B \in M_n(\mathbb{C})$ . Then*

3.  *$B^*B$  is positive semidefinite.*

4. *If  $B$  is invertible then  $B^*B$  is positive definite.*