

# HW1

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For a linear unitary operator  $U$ , the definition (2.2.6) of  $U^\dagger$  and the definition (2.2.2) of unitarity imply that

$$(U\Phi, U\Psi) = (\Phi, \Psi) = (\Phi, U^\dagger U\Psi) \quad (1)$$

which implies that  $U^\dagger = U^{-1}$  because the states  $\Phi$  and  $\Psi$  are arbitrary.

For an antilinear antiunitary operator  $U$ , the definition (2.2.7) of  $U^\dagger$  and the definition (2.2.4) of antiunitarity imply that

$$(U\Phi, U\Psi) = (\Phi, \Psi)^* = (\Phi, U^\dagger U\Psi)^* \quad (2)$$

which implies that  $U^\dagger = U^{-1}$  because the states  $\Phi$  and  $\Psi$  are arbitrary.