

Number:

Name:

Exercise 9 (deadline: July 21, 10:30 am, 2026)

- 1) Express $\boldsymbol{\sigma}_A \cdot \boldsymbol{\sigma}_B$ in terms of Kronecker products and derive Eq. (295).
- 2) Using the matrix representation of $\boldsymbol{\sigma}_A \cdot \boldsymbol{\sigma}_B$, show that

$$\boldsymbol{\sigma}_A \cdot \boldsymbol{\sigma}_B |\Psi^-\rangle = -3 |\Psi^-\rangle, \quad \boldsymbol{\sigma}_A \cdot \boldsymbol{\sigma}_B |\Psi^+\rangle = +1 |\Psi^+\rangle.$$

- 3) Derive Eq. (301).