Quantum Mechanics C (130C) Winter 2015
Midterm exam front page

Thursday, February 19, 2015, 11am-12:20pm

Please remember to put your name on your exam booklet. This is a closed-book exam. There are 4 problems, each with several parts, of varying levels of difficulty; make sure you try all of the parts as there are many opportunities for partial credit. None of the problems require very extensive calculation; if you find yourself involved in a morass of calculation, step back and think. Good luck.

Possibly useful information:

\[ \sigma^x = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \quad \sigma^y = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \quad \sigma^z = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \]

\[ |\uparrow\rangle = e^{-i\phi/2} \cos \frac{\theta}{2} |\uparrow_z\rangle + e^{+i\phi/2} \sin \frac{\theta}{2} |\downarrow_z\rangle \quad \text{satisfies} \quad \vec{\sigma} \cdot \vec{n} |\uparrow\rangle = |\uparrow\rangle \]

\[ e^{-i\alpha\hat{n} \cdot \vec{\sigma}} = \cos \alpha - i \hat{n} \cdot \vec{\sigma} \sin \alpha. \]