

Problem Set 4

(due Wednesday, February 5, 12:30 pm)

1. Problem 2.28, page 65 (a smooth double-well potential via the matrix method).
2. Problem 2.29, page 68 (ammonia as a two-state system).
3. Problem 3.2, page 74 (momentum-space wavefunction of a momentum eigenfunction).
4. Problem 3.3, page 74 (momentum-space wavefunction of a position eigenfunction).
5. Problem 3.5 page 75 (derive the operator formula for average momentum).
6. Problem 3.6, page 77 (computer plots of Gaussian wavepackets).
7. Problem 3.8, page 78 (properties of a Gaussian wavepacket). This problem has multiple parts and you'll need to budget a fair amount of time for it. Although you might be tempted to use a computer to help with the integrals, I think you'll actually find it easier to do everything with pencil and paper.
8. Problem 3.13, page 80 (Gaussian wavepacket for a pitched baseball).