HOMEWORK 1
(Due March 1, 2007)

So what happened to the old theory that I fell in love with as a youth? Well, I would say it’s become an old lady, that has very little attractive left in her and the young today will not have their hearts pound anymore when they look at her. Richard Feynman (Nobel Lecture)

Q: The Lagrangian for the 1-dimensional simple harmonic oscillator is

\[ \mathcal{L} = \frac{m}{2} \left( \frac{dq}{dt} \right)^2 - \frac{m \omega^2}{2} q^2 \]

a: Using the path integral method, compute the transition amplitude

\[ \langle q_f, t_f | q_i, t_i \rangle \]

b: From the transition amplitude, calculate the ground state energy and the ground state wave function.