Birzeit University
Department of Physics
Quantum Mechanics I, Phys433
Fall 2020
Homework 1: Due date Sep. 26th 2019

1. The wave function of an object of mass m in a quantum mechanical system is given by:

$$\psi(x,t) = \psi_0 exp(-\frac{x^2}{2b^2} - i\frac{\hbar}{2mb^2}t)$$

   where b has the units of length. Determine the potential energy V(x) of the system.

2. In class we wrote the time-independent schrodinger equation in the position space. Make the needed transformation to re-write it in the momentum space. After that prove that the solution in the momentum space is normalized given that the solution in the position space is also normalized.

3. In class we solved the infinite square potential of width a ($0 \leq x \leq a$). re-do the problem (or make a proper transformation) and solve the same problem for the same width but for ($-a/2 \leq x \leq a/2$). Comments on the difference in both wave functions and energies obtained in both solutions.

4. Solve the following problems from the book: 1.7,1.8,1.17,2.4,2.5