

PHYS 631: Quantum Mechanics I (Fall 2020)
Exercises 30 November 2020 (Monday, Week 10)
Due Monday, 7 December 2020

Exercise 1. Show that $[a, a^\dagger] = 1$, using $a = (x + ip)/\sqrt{2}$ (with scaled units).

Exercise 2. Prove (by induction) that

$$(x - \partial_x)^n e^{-x^2/2} = (-1)^n e^{x^2/2} \partial_x^n e^{-x^2}. \quad (1)$$