

Physics 115a

**Homework 4 (due May 3 at start of class)**

Assigned April 26

**4.1)** Using the definitions of  $a_{\pm}$  and the commutators evaluate the commutators  $[a_-, a_+]$  and  $[a_+, a_-]$

**4.2)** Griffiths problem 2.10 *Feel free to give your answer in terms of  $\tilde{x}$  instead of  $x$ . Also note that Griffiths Eqn. 2.62 may be helpful*

**4.3)** Griffiths problem 2.12

**4.4)** Griffiths problem 2.13 *(the methods of the previous problem should be useful here too).*