

Physics 3041 (Spring 2021) Homework Set 6 (**Due 3/10**)

1. Problem 9.5.11. (40 points)
2. Prove the following results on the commutators:  $[A, B + C] = [A, B] + [A, C]$ ,  $[A + B, C] = [A, C] + [B, C]$ ,  $[A, BC] = B[A, C] + [A, B]C$ ,  $[AB, C] = A[B, C] + [A, C]B$ . (10 points)
3. Follow the discussion of  $s_+ = s_x + is_y$  for the electron spin to derive the matrix representation of  $s_- = s_x - is_y$ . (20 points)
4. Problem 9.6.2, and find the solutions for  $x_1(t)$  and  $x_2(t)$  with the initial conditions  $x_1(0) = x_2(0) = 0$  and  $\dot{x}_1(0) = v_1$  and  $\dot{x}_2(0) = v_2$ . (30 points)