Assignment #6

Required Problems (Due May 2nd by the end of the day)
1. a. Draw the 3pz and 3px atomic orbitals.
   b. From the atomic orbitals, form the molecular orbitals, \( \psi = 3p_z + 3p_z, \psi = 3p_z - 3p_z, \)
   \( \psi = 3p_x + 3p_x, \) and \( \psi = 3p_x - 3p_x. \) (Draw them out.)
   c. Determine which of these are \( \sigma \) and \( \pi, \) which are bonding and anti-bonding, and which
   are gerade and ungerade. Label your drawings from part b appropriately.

2. Determine the molecular term symbols for \( \text{H}_2, \text{H}_2^+, \text{Li}_2, \text{B}_2, \text{O}_2, \) and \( \text{O}_2^+. \) Determine the
   ground state symbol for each.

3. From McQuarrie & Simon, Chapter 9 problems: 7, 12, 19 (support with electron
   configurations), 20, 26. Read 9-3.

4. Problems from Chapter 10 of McQuarrie & Simon: 12, 16-18, 30, 34**
   (** extra credit for solving the determinantal equation – I suggest using Mathcad **)