Problem 5.1
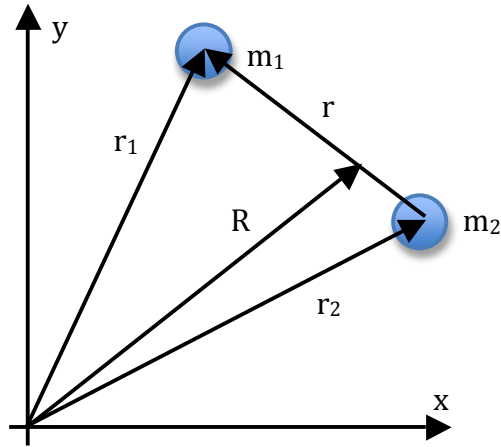
(a) Start with a sketch of the two particle system:

- Write the relative coordinate r in terms of r_1 and r_2 and write the center of mass R also in terms of r_1 and r_2.
- Now invert the equation to solve for r_1 and r_2 in terms of r and R.
- Use the definition of the reduced mass to simplify your expressions for r_1 and r_2.
- Use the expressions for r_1 and r_2 to find the momentum of each particle, p_1 and p_2.
- Finally, replace the momenta with their quantum mechanical operators.

Complete parts (b) and (c) from the text.