Central Forces Homework 1

Due 5/10/17, 4 pm

For every problem, before you start the problem, make a brief statement of the form that a correct solution should have, clearly indicating what quantities you need to solve for. This statement will be graded.

REQUIRED:

1. Consider the differential equation $y'' - 2y' + y = 0$.

   (a) Use the power series method to find the first six terms in each of two independent solutions to this differential equation.

   (b) Challenge Problem - Solve this differential equation using a different method and show that your answers are the same as part a.

2. Consider the differential equation $y'' = \frac{2}{(1-x)^2} y$.

   (a) Use a power series expanded about $x = 0$ to find the first six terms in each of two independent solutions to this differential equation.

   (b) For what values of x does each of your power series solutions converge?

   (c) Suppose you were to subtract one of your two solutions from the other solution. Is the resulting function still a solution to the original differential equation? Explain.