Differential Equations - Advanced Problem Set 3

Professor:
Dr. Joanna Bieri
joanna_bieri@redlands.edu

Directions: Do the following book problems

Section 3.1 27, 32, 51, 52

Other Notes:

1. Another option - If you are a math major who has taken Real Analysis, you can instead work through proofs of Theorems 1-4 in section 3.1. Here is a good video of some of the deeper theory and proof methods: https://www.youtube.com/watch?v=VpZOuOJ_ob4. Try to do the proof by your self before watching the video.

2. Challenge: If you are someone with some experience computer programming, Try programming Example 1 from section 3.3 so that you can automatically write the particular solution given the real distinct roots and the initial conditions. In other words your program should accept any number of roots $(r1, r2, ...)$, and initial point $x = a$, and a matching number of initial conditions $(y, y', y'', ...)$ and give you the constants back.

3. HINT for 51: Just do the substitution, then after you get equation (23) assume you are able to solve it and that it has real distinct roots r_1 and r_2 then transform back so the soln is in terms of x.

   Also, you are changing the independent variable here! This means that $y(x) \rightarrow y(v)$ you will need to use the chain rule to change the derivatives: $\frac{d}{dx}y(v) \rightarrow ???$.