

Math 3413.001: Physical Mathematics I

Homework 3, due February 6 (Thursday)

Lecture 5 (Jan 28) - Due date 02/06/2020 : Section 1.6

1. Determine if the differential equation $x^2y' = y(x + y)$ is homogeneous or Bernoulli or both. Give a solution using any method that applies.
2. Solve the differential equation $y' = 2x(y + y^2)$ using the method of Bernoulli equation. Also give a solution for the same differential equation using the method of separable DE.
3. Consider the differential equation $y'' = (y')^2$. It has both x and y variable missing. Give solutions to the DE using the two different methods corresponding to x -variable missing, and y -variable missing.

Suggested problems from the book (DO NOT SUBMIT): Pg 69-71, #2, 5, 20, 27, 48, 54

Lecture 6 (Jan 30) - Due date 02/06/2020 : Section 3.1

1. Verify by substitution that $y_1 = e^{2x} \cos(x)$ and $y_2 = e^{2x} \sin(x)$ are solutions for the DE $y'' - 4y' + 5y = 0$. Using y_1 and y_2 find the particular solution to the IVP $y'' - 4y' + 5y = 0, y(0) = 1, y'(0) = 2$.
2. Use the method of characteristic equation to find the general solution of
 - (a) $y'' - 3y' - 10y = 0$
 - (b) $4y'' - 4y' + y = 0$
3. Find a differential equation whose general solution is given by $y(x) = C_1 e^{13x} + C_2 e^{-7x}$.

Suggested problems from the book (DO NOT SUBMIT): Pg 147-148, #2, 11, 34, 35, 40, 46