AMS 361: Applied Calculus IV

Homework 1

Assignment Date: Tuesday (01/06/2021) 2:00 PM EDT
Collection Date: Tuesday (01/12/2020) Before 2:30 PM EDT
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Grades: **5** problems are worth **100 points**.

Student ID:		
Student Name:		
Problems	Score	Remarks
1.1		
1.2		
1.3		
1.4		
1.5		
Total Score:		

Problem 1.1 (15 points): Verify by substitution whether the given functions are solutions of the given DE. Primes denote derivatives with respect to x.

$y'' + y' = \sin 20x\,;\ \ y_1 = \cos x + \sin x\,, y_2 = \cos 20x + \sin x\,, y_3 = \cos x + \sin 20x$

Problem 1.2 (15 points): Verify that $y(x)$ satisfies the given DE and then determine a value of the constant C so that $y(x)$ satisfies the given initial condition (IC).

$$y' - 7x^6 y = 0; \quad y(x) = C * \exp(x^7)\,, \qquad y(0) = 2020$$

Problem 1.3 (20 points): Find the PS of the IVP:

$$\begin{cases} y' \sin x + y \cos x = 0 \\ y(\pi/2) = 2020 \end{cases}$$

Problem 1.4 (20 points): Solve the following IVP.

$$\begin{cases} (7 + x)y' + y = \sec x \cdot \tan x \\ y(x = 0) = \pi \end{cases}$$

Problem 1.5 (30 points): Find the GS of the DE (Primes denote derivatives WRT x):

$$y' = (xy' + y)y^{2020}$$

Hint: Recall relationship $y' = \frac{dy}{dx} = \left(\frac{dx}{dy}\right)^{-1}$ and regard x as DV and y as IV.

Reference to the Textbook is suggestive. Homework problems are not identical to those in the book but the solution methods are similar.