Homework 2

AMS 20: Mathematical Methods for Engineers

Due Tuesday August 13, 2019

Name: _____ Student ID: _____

Homework assignments will count for 25% of your overall grade. Attach extra paper as needed. Show all of your work for full credit.

1. **[30pts] Homogeneous 2nd Order ODEs.** Find the general solution to the following homogeneous ODEs.
   (a) **[10pts]** $y'' + 6y' + 2y = 0$
   (b) **[10pts]** $4y'' + 2y' + 3y = 0$
   (c) **[10pts]** $y'' - 3y' + \frac{9}{4}' = 0$

2. **[20pts] Homogeneous 2nd Order ODEs.** Find the solution to the IVP.

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0 \qquad y(\pi) = e^{\pi}, \quad y'(\pi) = 0$$

3. **[15pts] Non-Homogeneous 2nd Order ODEs.** Find the general solution to the following non-homogeneous ODE using the method of undetermined coefficients.

$$4y'' + 11y' - 3y = -2te^{-3t}$$

4. **[15pts] Non-Homogeneous 2nd Order ODEs.** Find the general solution to the following non-homogeneous ODE using variation of parameters.

$$y'' + y = 3\sec(t) - t^2 + 1$$

5. **[20pts] Non-Homogeneous 2nd Order ODEs.** Find the solution to the IVP using any method you like.

$$y'' - y' - 2y = \cos(x) - \sin(2x) \qquad y(0) = -\frac{7}{20}, \quad y'(0) = \frac{1}{5}$$