Worksheet #4
Date : 07/02/2024 **Name:** _____
MTH204: ODEs/PDEs
Semester: Winter 2024 **Section:** _____

Problem 1. Solve the ODE

$$x^2y'' - 3xy' + 10y = 0.$$

Problem 2. Solve the ODE

$$x^2y'' + xy' + 9y = 0, \quad \text{given that} \quad y(1) = 0, \quad y'(1) = 2.5$$

Problem 3. Find the solution of

(a) $y'' + y' + \left(\pi^2 + \frac{1}{4}\right) y = e^{-x/2} \sin \pi x.$

(b) $8y'' - 6y' + y = 6 \cosh x, \quad$ given that $\quad y(0) = 0.2, \quad y'(0) = 0.05.$

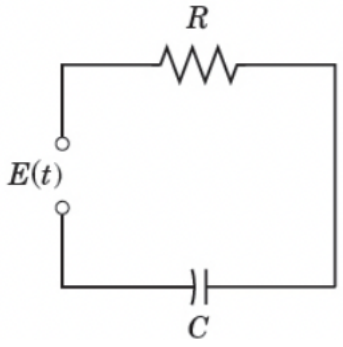
Problem 4. Find the transient motion of the mass-spring system modeled by the ODE

$$y'' + y = \cos \omega t, \quad \omega^2 \neq 1$$

Problem 5. Find the motion of the mass-spring system modeled by the ODE and the initial conditions

$$y'' + 5y = \cos \pi t - \sin \pi t, \quad y(0) = 0, \quad y'(0) = 0$$

Problem 6. Model the RC circuit of the figure below.



(a) Find the current due to a constant E.

(b) Find the current when $E = E_0 \sin \omega t$ and, E_0 and ω are arbitrary.