

## Review

1. Solve the differential equations

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

$$x^2y'' - 5xy' + 12y = 0.$$

2. Solve the initial value problems

$$x^2y'' + 3xy' + y = 0, \quad y(1) = 0, y'(1) = 1,$$

$$x^2y'' + 5xy' + 3y = 0, \quad y(1) = -3, y'(1) = 1.$$

3. Using the method of the Laplace transform, solve the following initial value problems

$$y'' + 4y' = \begin{cases} e^t & t < 2, \\ 0 & t \geq 2 \end{cases}, \quad y(0) = 0, y'(0) = 1,$$

$$y' - 5y = \begin{cases} t & t < 3, \\ 0 & t \geq 3 \end{cases}, \quad y(0) = -1, y'(0) = 0,$$

$$y''' - 2y'' - y' + 2y = 0, \quad y(0) = 1, y'(0) = 2, y''(0) = -1,$$

$$y''' + y'' + y' + y = e^{-t}, \quad y(0) = y'(0) = y''(0) = 0.$$