

Review

1. Solve the differential equations

$$\begin{aligned}x^2y'' + 3xy' + 5y &= 0, \\x^2y'' - 3xy' + 4y &= 0.\end{aligned}$$

2. Solve the initial value problems

$$\begin{aligned}x^2y'' + 6xy' + 6y &= 0, & y(1) &= 1, y'(1) = 3, \\x^2y'' + 4xy' + 2y &= 0, & y(1) &= 3, y'(1) = -1.\end{aligned}$$

3. For each of the following initial value problems find $y'''(0)$:

$$\begin{aligned}y'' + xy' + y &= 0, & y(0) &= 1, y'(0) = 0, \\y'' + 4y' + 6xy &= 0, & y(0) &= -1, y'(0) = 1.\end{aligned}$$

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

$$\begin{aligned}y'' + 6y' + 9y &= t, & y(0) &= 2, y'(0) = -1, \\y'' + y &= \sin 2t, & y(0) &= -1, y'(0) = 2, \\y'' + 4y' + 5y &= \begin{cases} \sin t & t < \pi, \\ \cos t & t \geq \pi \end{cases}, & y(0) &= 0, y'(0) = 1, \\y'' + 4y &= \begin{cases} t & t < 1, \\ 0 & t \geq 1 \end{cases}, & y(0) &= -1, y'(0) = 0, \\y''' + 3y'' + 3y' + y &= t^2, & y(0) &= y'(0) = 1, y''(0) = 2, \\y''' + y'' - y' - y &= 1, & y(0) &= y'(0) = 0, y''(0) = -1.\end{aligned}$$