

1. Find the first six terms of a series solution of $y'' - xy' - y = 0$ in powers of x .
2. Use Laplace transforms to solve $y'' - 4y' + 4y = 0$, $y(0) = y'(0) = 1$.
3. Use Laplace transforms to solve $y'' + 2y' + 2y = \delta(t - \pi)$, $y(0) = 1$, $y'(0) = 0$.
4. Find the general solution of $x' = \begin{pmatrix} 1 & -2 \\ 3 & -4 \end{pmatrix} x$.