

EXAM FOUR SAMPLE

1. Find the convolution $t^2 * t^3$.
2. Use convolution to express a particular solution to $x'' + x = \tan t$ as an integral—then evaluate.
3. Use the Taylor Series Method to find the first 4 terms of a series solution for $y' = y^2 - xy$ with $y(0) = 2$.
4. Find the singular points of $(x^2 - 9)^2 y'' + (x^2 - 3x)y' + (x + 3)y = 0$ and classify them as regular or irregular.
Then find a minimum value for the radius of convergence of a power series solution about $x_0 = 1$.
5. Find the indicial equation of $6x^3 y''' + 13x^2 y'' + (x^2 + 2x)y' + xy = 0$ and give the form of the general solution.
6. Find the first four terms of a power series for $\int \frac{e^x}{1-x} dx$.
7. Find the recurrence relation and the first 5 nonzero terms in a power series solution of $y'' = 2xy$ with $y(0) = 6$ and $y'(0) = 3$.
8. Solve the Cauchy-Euler differential equation $x^2 y'' - 5xy' + 8y = 2x^3$ with $y(1) = 3$ and $y'(1) = 5$.