EXTRA PROBLEMS FOR POWER SERIES SOLUTIONS TO DIFFERENTIAL EQUATIONS

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Find a power series solution to the following differential equations.

1. Solve $y' = x^2y$ with initial conditions $y(0) = 1$.
2. Solve $y' + (2x - 1)y = 0$ with initial conditions $y(0) = 2$.
3. Solve $y'' = xy' + y$ with initial conditions $y(0) = 1$ and $y'(0) = 0$.
4. Solve $(x^2 + 1)y'' + xy' - y = 0$ with initial conditions $y(0) = 1$ and $y'(0) = 1$.
5. Solve $y'' + x^2y + xy = 0$ with initial conditions $y(0) = 0$ and $y'(0) = 1$.
6. Solve $y'' + x^2y = 0$ with initial conditions $y(0) = 1$ and $y'(0) = 0$.
7. Solve $y'' = y$ with initial conditions $y(0) = 1$ and $y'(0) = -1$.
8. Solve $x^2y'' + xy' + x^2y = 0$ with initial conditions $y(0) = 1$ and $y'(0) = 0$. 