DECA Chapter 5 Test

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1. Write the series

$$\sum_{n=2}^{\infty}(n+2)(n+1)a_n(x-x_0)^{n-2}$$

as a series whose generic term involves $(x-x_0)^n$ rather than $(x-x_0)^{n-2}$

2. Determine the radius of convergence of the power series

$$\sum_{n=1}^{\infty}\frac{(x+1)^n}{n2^n}$$

3. Find a series solution of the equation

$$y(x)'' + y(x) = 0, \qquad -\infty < x < \infty$$

Follow the steps to receive partial credit

1. Find y'', y', y for the power series of the form $\sum_{n=0}^{\infty} a_n x^n$
2. Express the sum of the two power series as one
3. Solve a recursive expression
4. Find a separate power series for even and odd
5. Combine the two for the final answer
6. Express sin and cos as an initial value condition for the final answer

4. Find a power series solution for Airy's equation

$$y'' - xy = 0$$

5. Find a solution for Airy's equation in powers of $x-1$

6. Solve

$$2x^2y'' + 3xy' - y = 0, \qquad x > 0$$

7. Solve

$$x^2y'' + 5xy' + 4y = 0, \qquad x > 0$$