In Problems 1 and 2 without actually solving the given differential equation, find the minimum radius of convergence of power series solutions about the ordinary point $x = 0$. About the ordinary point $x = 1$.

1.

$$(x^2 - 25)y'' + 2xy' + y = 0$$

2.

$$(x^2 - 2x + 10)y'' + xy' - 4y = 0$$

In Problems 7–18 find two power series solutions of the given differential equation about the ordinary point $x = 0$.

9.

$$y'' - 2xy' + y = 0$$

11.

$$y'' + x^2 y' + xy = 0$$

14.

$$(x + 2)y'' + xy' - y = 0$$

17.

$$(x^2 + 2)y'' + 3xy' - y = 0$$

In Problems 19–22 use the power series method to solve the given initial-value problem.

19.

$$(x - 1)y'' - xy' + y = 0, \quad y(0) = -2, \quad y'(0) = 6$$

In Problems 23 and 24 use the procedure in Example 8 to find two power series solutions of the given differential equation about the ordinary point $x = 0$.

23.

$$y'' + (\sin x)y = 0$$

24. Optional

$$y'' + e^x y' - y = 0$$