

Problem 6

In each of Problems 1 through 6, determine intervals in which solutions are sure to exist.

$$(x^2 - 4)y^{(6)} + x^2y''' + 9y = 0$$

Solution

Divide both sides by $x^2 - 4$ so that the coefficient of the highest derivative is 1.

$$y^{(6)} + \frac{x^2}{x^2 - 4}y''' + \frac{9}{x^2 - 4}y = 0$$

The points of discontinuity are $x = -2$ and $x = 2$, so depending when the initial conditions are given, the solution to this ODE will be valid either for $-\infty < x < -2$ or $-2 < x < 2$ or $2 < x < \infty$.