Problem 2

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

\[ ty''' + (\sin t)y'' + 3y = \cos t \]

Solution

Divide both sides by \( t \) so that the coefficient of the highest derivative is 1.

\[ y''' + \frac{\sin t}{t}y'' + \frac{3}{t}y = \frac{\cos t}{t} \]

A point of discontinuity is \( t = 0 \), so depending when the initial conditions are given, the solution to this ODE will be valid either for \( -\infty < t < 0 \) or \( 0 < t < \infty \).