

Problem 10

In each of Problems 7 through 12, determine the longest interval in which the given initial value problem is certain to have a unique twice-differentiable solution. Do not attempt to find the solution.

$$y'' + (\cos t)y' + 3(\ln |t|)y = 0, \quad y(2) = 3, \quad y'(2) = 1$$

Solution

There is a point of discontinuity at $t = 0$, which means the interval in which the general solution is unique and twice-differentiable is either $-\infty < t < 0$ or $0 < t < \infty$. Because y and y' are prescribed at $t = 2$, the general solution is unique and twice-differentiable on $0 < t < \infty$.