

Problem 3

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

$$t(t-1)y^{(4)} + e^t y'' + 4t^2 y = 0$$

Solution

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

$$y^{(4)} + \frac{e^t}{t(t-1)} y'' + \frac{4t}{t-1} y = 0$$

Two points of discontinuity are $t = 0$ and $t = 1$, so depending when the initial conditions are given, the solution to this ODE will be valid either for $-\infty < t < 0$ or $0 < t < 1$ or $1 < t < \infty$.