

Problem 24

In each of Problems 24 through 26:

- (a) Draw a direction field for the given differential equation. How do solutions appear to behave as $t \rightarrow 0$? Does the behavior depend on the choice of the initial value a ? Let a_0 be the value of a for which the transition from one type of behavior to another occurs. Estimate the value of a_0 .
- (b) Solve the initial value problem and find the critical value a_0 exactly.
- (c) Describe the behavior of the solution corresponding to the initial value a_0 .

$$ty' + (t + 1)y = 2te^{-t}, \quad y(1) = a, \quad t > 0$$