

Problem 21

In each of Problems 21 through 23:

- (a) Draw a direction field for the given differential equation. How do solutions appear to behave as t becomes large? 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 .

$$y' - \frac{1}{2}y = 2 \cos t, \quad y(0) = a$$