

Problem 15

Consider the initial value problem

$$y'' + \gamma y' + y = k\delta(t - 1), \quad y(0) = 0, \quad y'(0) = 0,$$

where k is the magnitude of an impulse at $t = 1$, and γ is the damping coefficient (or resistance).

- (a) Let $\gamma = \frac{1}{2}$. Find the value of k for which the response has a peak value of 2; call this value k_1 .
- (b) Repeat part (a) for $\gamma = \frac{1}{4}$.
- (c) Determine how k_1 varies as γ decreases. What is the value of k_1 when $\gamma = 0$?