

1. Solve the IVP and sketch the solution in the  $ty$ -plane:

a.  $y'' + 2y' + 2y = 0$ ,  $y(\pi/4) = 2$ ,  $y'(\pi/4) = -2$

b.  $y'' + 3y' = 0$ ,  $y(0) = -2$ ,  $y'(0) = 3$

c.  $y'' + 8y' - 9y = 0$ ,  $y(1) = 1$ ,  $y'(1) = 0$

2. A mass weighing 3 lb stretches a spring 3 in. If the mass is pushed upward, contracting the spring a distance of 1 in., and then set in motion with a downward velocity of 2 ft/sec, and if there is no damping, find the position  $y$  of the mass at any time  $t$ . Sketch the solution in the  $ty$ -plane.

3. A mass weighing 8 lb stretches a spring 1.5 in. The mass is also attached to a damper with a coefficient  $\gamma$ . Determine the value of  $\gamma$  for which the system is critically damped.