

## Problem 19

Consider the vibrating system described by the initial value problem

$$u'' + u = 3 \cos \omega t, \quad u(0) = 1, \quad u'(0) = 1.$$

- (a) Find the solution for  $\omega \neq 1$ .
- (b) Plot the solution  $u(t)$  versus  $t$  for  $\omega = 0.7$ ,  $\omega = 0.8$ , and  $\omega = 0.9$ . Compare the results with those of Problem 18; that is, describe the effect of the nonzero initial conditions.