

## Second-Order Nonhomogeneous Equations

Math 230

Solve each linear differential equation by completing the following steps:

- (a) Write the associated homogeneous equation and find its general solution  $k_1y_1(t) + k_2y_2(t)$ .
- (b) Find *any* particular solution  $y_p(t)$  to the nonhomogeneous equation.
- (c) The general solution to the nonhomogeneous equation is  $k_1y_1(t) + k_2y_2(t) + y_p(t)$ .

What is the long-term behavior (as  $t \rightarrow \infty$ ) of each solution that you find?

1.  $y'' + 4y = \cos(t)$

2.  $y'' + 2y' + y = e^{-t}$

3.  $y'' + 6y' + 8y = 2t + e^t$

4.  $y'' + 5y' + 6y = \sin(t)$