

Worksheet 19
April 16th, 2008

1. Find a particular solution to $y'' + y = t$. Now find one where $y'' \neq 0$.
2. Find the general solution to
 - (a) $y'' + y = \sin(t)$
 - (b) $y'' - 4y' + 4y = e^{2t}$
3. Solve the Initial Value Problem
 - (a) $y'' + y = \sin(\alpha t)$, $\alpha \neq 1$ and $y(0) = 0$, $y'(0) = 1$
 - (b) $y'' - 2y' - 3y = -3t^2 + 2t + 8$, $y(0) = 2$ and $y'(0) = -4$
4. A 1 kg block falls out of an airplane. Suppose at any time in the air, the air resistance force is given by $F_d = -v$, where v is the velocity. Taking into account only gravity and air resistance, what equation describes the fall of the block? (We can also give the initial conditions, $y(0) = 10000$, $y'(0) = 0$.) Compare your answer with a free fall with no air resistance.