Problems from Lecture 2

In class we discussed the four paradigmatic types of harmonic oscillators:

the undamped free oscillator
the undamped driven oscillator
the damped free oscillator
the damped driven oscillator

by converting their respective second-order differential equations into the corresponding second-order algebraic equations, thereby making it extremely easy to simply write down the solutions.

(1) Go through this process until you can do it without looking at your notes/books/etc.

(2) Write down the specific solution for each case.

(3) Show that the solutions to all four cases can be extracted from the general solution to the damped driven oscillator by turning on and off the damping term and the driving term.