

Differential Equations
Problem Set 13
The Laplace Transform: Solving Differential
Equations

Solve the following problems and verify your solution.

1. $\ddot{X}(t) - (a + b)\dot{X}(t) + abX(t) = 0$ ($a \neq b$)
2. $\ddot{X}(t) + k^2X(t) = a$ ($k \neq 0$)
3. $\ddot{X}(t) + 2k\dot{X}(t) + k^2X(t) = 0$
4. $\ddot{X}(t) + 4X(t) = \sin t$ with $X(0) = \dot{X}(0) = 0$
5. $\ddot{X}(t) + \dot{X}(t) = e^{2t}$ with $X(0) = \dot{X}(0) = \ddot{X}(0) = 0$
6. $\ddot{X}(t) + \dot{X}(t) = t^2 + 2t$ with $X(0) = 4$ and $\dot{X}(0) = -2$