

BEEM103 – Optimization Techniques for Economists	Dieter Balkenborg Departments of Economics
Homework Week 6	University of Exeter

Exercise 1 Find the solutions of the form $e^{\alpha x}$ to the homogenous equation

$$\ddot{x} - \dot{x} - 6x = 0$$

Exercise 2 Find a solution to the inhomogeneous equation

$$\ddot{x} - \dot{x} - 6x = 3$$

Exercise 3 Describe all solutions to this equation.

Exercise 4 Find a solution with $x(0) = 0$, $x(1) = 1$

Exercise 5 Minimize

$$\int_0^1 (t\dot{x} + \dot{x}^2) dt$$

subject to the boundary conditions $x(0) = 1$, $x(1) = 0$.

Exercise 6 Minimize

$$\int_0^1 (x^2 + tx + tx\dot{x} + t^2\dot{x}^2) dt$$

subject to the boundary conditions $x(0) = 0$, $x(1) = 1$.