

Economics 511 Problem Set 23
Linear Second-Order Differential Equations

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1. Find the general solutions to the following differential equations.

(a) $\ddot{y} + 5\dot{y} - 6y = 36$

(b) $\ddot{y} + 2\dot{y} + 10y = 30$

(c) $\ddot{y} - 4\dot{y} + 4y = 4$

(d) $\ddot{y} - 3\dot{y} = 12$

2. For parts (a) - (c) in question 1 determine the constants of integration given the following initial values.

(a) $y(0) = 11, y'(0) = 3$

(b) $y(0) = 6, y'(0) = 9$

(c) $y(0) = 2, y'(0) = 4$

3. Provide three examples of linear, second-order differential equations with constant coefficients that result in 1) distinct real roots 2) repeated real roots and 3) complex roots. Then solve them.