

The University of Zambia
Department of Mathematics and Statistics
Mat 3110-Engineering Mathematics II

Assignment 1

1. Find the general solution of the following differential equations.

(a) $(x + 1)y' - (2x + 3)y = 0$ (b) $y'' - 3y' + 2y = 0$ (c) $y'' - 4xy' + (4x^2 - 2)y = 0$
(d) $(1 - x^2)y'' - 2xy' + 2y = 0$ (e) $x^2y'' + xy' - y = 0$ (f) $x^2y'' + 3xy' + y = 0$

2. Solve the following initial value problems.

(a) $4x^2y'' - 4xy' - y = 0$, $y(4) = 2$, $y'(4) = \frac{1}{4}$
(b) $x^2y'' - 5xy' + 8y = 0$, $y(1) = 5$, $y'(1) = 18$

3. Find the general solution of each system below.

(a) $\mathbf{x}' = \begin{pmatrix} -3 & 2 \\ -1 & -5 \end{pmatrix} \mathbf{x}$ (b) $\mathbf{x}' = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix} \mathbf{x}$ (c) $\mathbf{x}' = \begin{pmatrix} 2 & -5 \\ 1 & -4 \end{pmatrix} \mathbf{x}$