VANDERBILT UNIVERSITY

MATH 2610 – ORDINARY DIFFERENTIAL EQUATIONS

Examples of section 4.7

Question 1. Find two linearlly independent solutions of
$$x^2 y'' - 4xy' + 6y = 0.$$

Solutions.

1.This is a Cauchy-Euler equation with $a = 1$, $b = -4$ and $c = 6$. Its characteristic equation is then
$$a\lambda^2 + (b-a)\lambda + c = \lambda^2 - 5\lambda + 6 = 0,$$
whose solutions are
$$\lambda_1 = 2, \text{ and } \lambda_2 = 3.$$
Therefore
$$y_1 = x^2, \text{ and } y_2 = x^3$$
are two linearly independent solutions of the equation.