MA 2326
Assignment 5
Due 5 March 2015

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1. Show that

$$W(x, x_0) = \frac{1}{3}\begin{pmatrix} x^2 x_0^{-2} + 2x^{-1}x_0 & x^2 x_0^{-1} - x^{-1}x_0^2 \\ 2xx_0^{-2} - 2x^{-2}x_0 & 2xx_0^{-1} + x^{-2}x_0^2 \end{pmatrix}$$

   is a fundamental matrix for

$$A(x) = \begin{pmatrix} 0 & 1 \\ 2x^{-2} & 0 \end{pmatrix}.$$

   Use this to find the solution to the inhomogenous initial value problem

$$x^2 y''(x) - 2y(x) = 1,$$

$$y(x_0) = y_0, \quad y'(x_0) = v_0$$

   for $x > 0$.

2. Find a non-zero quadratic polynomial which satisfies

$$(1 - x^2)y''(x) - 2xy'x + 6y(x) = 0$$

   and then find a second, linearly independent, solution.