MA530. Midterm exam.

Students have two choices, they can do this exam "in class" on Oct 25 or "takehome"
In class: to get "A" one should solve any 3 problems
Takehome (due Nov. 1): to get "A" one should solve all problems
"to solve" means to present a correct detailed analytical solution

#20 p.39

Find an integrating factor, use it to find the general solution of the differential equation, and to obtain the solution of the initial value problem:

$$2y(1+x^2) + xy' = 0; \;\; y(2) = 3$$

Hint: try $\mu = x^{\alpha} e^{b}$

#14 p. 63

Find the general solution

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

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Solve the initial value problem

$$y'' - 3y' = 2e^{2x}\sin(x); \qquad y(0) = 1;\ \ y'(0) = 2$$

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Solve the initial value problem

$$x^2y'' - 4xy' + 6y = x^4e^x; \quad y(2) = 2; \quad y'(2) = 7$$

#40 p. 140

Solve the initial value problem by using the Laplace transform

$$y'' + 5y' + 6y = f(t); \quad y(0) = 0; \quad y'(0) = -4, \text{ with}$$

$$f(t) = \begin{cases} t^2 & \text{for} \quad 0 \le t < 3 \\ 0 & \text{for} \quad t \ge 3 \end{cases}$$

#12 p. 174

Find the recurrence relation and use it to generate the first five terms of the Maclaurin series of the general solution

$$y'' + xy' = 1 - e^x$$

#8 p. 189

(a) find the indicial equation
(b) determine the apropriate form of each of two linearly independent solutions
(c) find the first five terms of each of two linearly independent solutions

$$4x^2y'' + 4xy' + (4x^2 - 9)y = 0$$