MATH 320 - SEC 001, SPRING 2012. HOMEWORK 2

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Due : Wednesday, February 8.

Please show all your work and/or justify your answers.

Section 1.3: 21, 27, 30.
Section 1.4: 10, 23, 50, 60, 62
Section 1.5: 19, 37, 38

Problem: Determine weather existence of at least one solution of the initial value problem

$$\begin{cases} y\frac{dy}{dx} = x - 1 \\ \\ y(0) = 1 \end{cases}$$

is guaranteed and, if so, determine weather the solution is unique.

Problem Figure 1 shows the slope field of the differential equation $\frac{dy}{dx} = xy\ln(y)$, where $y = 1$ is clearly a solution. Show that this is the unique solution to the initial value problem:

$$\begin{cases} \frac{dy}{dx} = xy\ln(y) \\ \\ y(1) = 1 \end{cases}$$

Hint: Find an antiderivative of $\frac{1}{y\ln(y)}$.