April 20, 2007
Answer questions, Section 12.1

Problem #5

$y(x) = Ce^{x^2}$

Claim Solution to $y' = 2xy$

Is it indeed a solution?

$y(x) = Ce^{x^2}$

$y'(x) = Ce^{x^2}(2x)$

Substitution

$y' = 2xy$

$Ce^{x^2}(2x) ? = ? 2x\left(Ce^{x^2}\right)$

Since this is a true statement, the function y(x) is a solution

Problem #9

Given the differential equation $y' = \frac{y}{x^2}$, is $y = Ce^{-1/x}$ a solution?

$y = Ce^{-1/x}$

$y' = Ce^{-1/x}\left(\frac{1}{x^2}\right)$

If we substitute y and y’ into the differential equation, we have

$y' = \frac{y}{x^2}$

$Ce^{-1/x}\left(\frac{1}{x^2}\right) ? = ? \frac{Ce^{-1/x}}{x^2}$

Since these are equal, this is a solution

Problem #13

Given $y_p = e^x + C$. Claim this is a solution to the boundary value problem $y' = e^x$, $y(0) = 0$.

The fact that y(0) = 0 tells us when x = 0, then y = 0. Tis allows us to find C. Plug these values for x and y into the solution, I have $0 = e^0 + C$ or $0 = 1 + C$; so C = -1. The solution to the boundary value problem ($y' = e^x$, y(0) = 0) is $y = e^x – 1$.