April 20, 2007
Answer Questions Section 12.1

Problem #9

Show that $y = Ce^{-1/x}$ is a solution to the differential equation y' = y/x^2.

Take $y = Ce^{-1/x}$ and its derivative and plug those into y' = y/x^2 and we should get a true statement.

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

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

Problem #19

If $y_p = Ce^{-1/x}$ is a solution to y' = y/x^2 and we have boundary values y(1) = 1, what is C?

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

$$C = e$$

The solution to the boundary value problem y' = y/x^2, y(1) = 1 is

$y = e\, e^{-1/x} = e^{1-1/x}$

Problem #21

Solve y' = $4x^3$, y(0) = 3

y' = $4x^3$

y = x^4 + C

If y(0) = 3 (When x = 0, y = 3), find C.

3 = 0^4 + C

C = 3

Answer: y = x^4 + 3

Problem #25

$$y' = 2xe^{x^2},\ y(0) = 1$$

$$y = \int 2xe^{x^2}\ dx$$

$$u = x^2$$

$$du = 2x\ dx$$

Solve $y = \int e^u\ du = e^u + C$

$$y = e^{x^2} + C$$

$$x = 0, y = 1$$

$$1 = e^0 + C$$

$$C = 0$$

$$y = e^{x^2}$$