Math 4230 Assignment 8, due Wednesday, April 13th.

(1) Find the steady-state current in the circuit shown in Figure 3.23c (page 144) but with $C = 2$, $L = R_1 = R_2 = 1$.

(2) Find the circle of convergence of the following power series using the formula from exercise 5.3.2: $R = 1/(\lim_{n\to\infty} |\frac{a_{n+1}}{a_n}|)$

(a) $\displaystyle\sum_{n=0}^{\infty} 3^n (z-3)^n$

(b) $\displaystyle\sum_{n=0}^{\infty} \frac{(i+1)^n}{n^3}(z+1)^n$

(c) $\displaystyle\sum_{n=0}^{\infty} n^n z^n$

(3) Find the power series solution $\sum_{n=0}^{\infty} a_n z^n$ around $z = 0$ which satisfies the differential equation

$$(1-z^2)g'' - 4zg - 2g = 0,\ \ g(0) = 1,\ \ g'(0) = 0.$$

(4) In problem 5.3.17, page 261, the Gaussian hypergeometric series ${}_2F_1(b, c; d; z)$ is defined. If $g(z) = \frac{1}{(1-z^2)^2}$, show that $g(z) = {}_2F_1(2, 3; 3; z^2)$. It may help to use the identity $g(z) = \frac{1}{2z}\frac{d}{dz}\left(\frac{1}{1-z^2}\right)$.