HOMEWORK #6
Due in Class on Thursday 11/20/08

Readings:
Read Chapters 6 and 7 in Nishimura

Problems: (In Nishimura unless otherwise stated)

1. Problem 5.1
2. Problem 5.6
3. Problem 6.1
4. Problem 7.3. For parts c and d use MATLAB to plot the signal difference as a function of TR and TE, respectively. Verify that the maximum achieved is the same as your analytical solution.
5. Problem 7.7

6. **MATLAB exercise 1**. In this exercise you will experiment with how different imaging parameters alter the contrast of an image. First download the file BE280A08_hw6.mat from the course website. In this file you will find three matrices labeled csf, gm, and wm, which are the partial volume maps for cerebral spin fluid, gray matter, and white matter, respectively. Assume the values shown in the table below. Assume that your MRI system can have a minimum echo time (TE) of 3 ms and a maximum TR of 15,000ms. Finally, assume that you are using a saturation-recovery sequence. Come up with sequence parameters that yield proton-density, T1-weighted, and T2-weighted images and use the partial volume maps to generate corresponding images. For the T1-weighted image, choose parameters that maximize the contrast between gray and white matter -- you will want to use MATLAB to search over possible TR values.

Tissue	Proton Density	T1 (ms)	T2 (ms)
Csf	1.0	4000	2000
Gray	0.85	1350	110
White	0.7	850	80