Name:

Medical Physics 710 / BME 710   **Due: Oct. 22nd , 2018**

Journal Discussion 5, Quiz #3: O Dietrich et al., **Measurement of Signal-to-Noise Ratios in MR Images: Influence of Multichannel Coils, Parallel Imaging, and Reconstruction Filters, JMRI 2007**

Due: October 22nd at beginning of class. Please turn in by hand, email, or submission to Learn@UW.

Question 1: (3 points)

Some reconstruction filters introduce inhomogeneity to the spatial distribution of noise intensities over an image, while other filters do not. From which of the following filters could you expect a reasonably accurate SNR (with deviation less than 10%) when SNR is computed using the SNR$_{mean}$ and SNR$_{dev}$ two-region methods? Assume you are scanning a phantom image using a 1CH head coil without parallel imaging. Mark all that apply.

> a. No filter
>
> b. Hanning filter
>
> c. Large-FOV compensation filter
>
> d. Intensity normalization filter
>
> e. Elliptical filter

Question 2: (4 points)

Explain why the two-region approaches to SNR calculation, SNR$_{mean}$ and SNR$_{dev}$, show tolerable deviations (less than 10%) for 1CH SSFP and EPI sequences, but demonstrate considerable bias for all 8CH acquisitions, with and without parallel acceleration.

Question 3: (3 points)

You are working as an imaging scientist in a Radiology Dept and your Department chair decides that he wants to do add quality control for his MRI scans. For one week he wants to estimate the SNR in the last scan series (aka last imaging sequence) of each subject that is scanned. He wants to do this with the same method across all those scans. Which method out of the Dietrich paper do you suggest and why.