PHYS 703 - Split Sphere Problem and Orthogonal Functions

1.

   (a) Determine the electric field close to and far from the conducting sphere with hemispheres at different potentials (described in Jackson, section 2.7) as best as you can using the expansion derived in the text. Make comparisons with what you expect.

   (b) Determine the total charge on each hemisphere, again, as best as you can.

2. Consider the first 4 Legendre polynomials $P_0(\cos\theta)$, $P_1(\cos\theta)$, $P_2(\cos\theta)$, $P_3(\cos\theta)$ on the interval [-1, 1]. Expand these in terms of a Fourier series in the usual sine and cosine basis (see for example, Jackson's equation (2.36)).