

## Homework 3

Due Wednesday 11 May (Midterm Friday 13 May)

1. 17.2.1, p. 457 from Shankar
2. 17.2.2, p. 457 from Shankar
3. 17.2.5, p. 457 from Shankar

The spherical harmonic addition theorem might be useful:

$$\frac{1}{r_{12}} = \frac{1}{|\mathbf{r}_1 - \mathbf{r}_2|} = \sum_{\ell=0}^{\infty} \sum_{m=-\ell}^{\ell} \frac{4\pi}{2\ell+1} \frac{r_{<}^{\ell}}{r_{>}^{\ell+1}} Y_{\ell}^{m*}(\theta_1, \phi_1) Y_{\ell}^m(\theta_2, \phi_2)$$

where  $r_{>}$  stands for the larger of the two distances  $r_1$  and  $r_2$ , and  $r_{<}$  the smaller.

4. 17.3.2, p. 466 from Shankar