Physics 611 **Homework #5** **handed out 17 November 2016**
due 29 November 2016

1. (a) From the recursion formulas given in Jackson [Eq. (9.90)], show that the spherical Bessel functions satisfy,

$$j_{\ell-1}(x) = \frac{1}{x^{\ell+1}} \frac{d}{dx} \left(x^{\ell+1} j_\ell(x) \right) .$$

(b) Also show that

$$j_{\ell+1}(x) = -x^a \frac{d}{dx} \left(x^{-a} j_\ell(x) \right) ,$$

where a is some integer you should find in terms of ℓ.

(c) Explicitly show that the latter formula with $j_\ell(x) = j_0(x) = \big(\sin(x)\big)/x$ gives the correct $j_1(x)$ (quoted in Jackson).

2. Jackson 9.2

3. Jackson 9.3

4. Jackson 10.1