MA/PHY506 Fall 2018
Problem Set 3
DUE: Wednesday, 26 September 2018

1. Study the power series solutions about $x_0 = 0$ to Hermite's equation: $y'' - 2xy' + 2\lambda y = 0$. Show that this equation is obtained from the quantum mechanical harmonic oscillator Schrödinger equation $-\psi'' + x^2\psi = E\psi$ by writing $\psi(x) = y(x)e^{-x^2/2}$ and $2\lambda = E - 1$. For what values of λ does one have a polynomial solution? Write out the first few polynomial solutions. These, properly normalized, are the Hermite polynomials.

2. Arfken, Chapter 7, pages 370–373, problems 7.6.3, 7.6.4, 7.6.9.

3. Arfken, Chapter 7, pages 370–373, problems 7.6.16, 7.6.19, 7.6.26.