

Problem Set #7

Due Wednesday, November 7, 2007

1. The Legendre polynomials can be obtained from the generating function

$$G(z, h) = (1 - 2zh + h^2)^{-1/2} = \sum_{n=0}^{\infty} P_n(z) h^n$$

Use the generating function to find the first six Legendre polynomials ($n = 0$ to $n = 5$).

2. RHB Problem 17.9.
3. RHB Problem 17.10, parts (a) and (c).
4. RHB Problem 17.13
5. RHB Problem 18.4

Additional problem for practice -- **REQUIRED FOR PH561 STUDENTS!**

6. RHB Problem 18.6.

Note: I believe that the statement of the problem, at least in my book, is missing an initial minus sign, i.e. the correct potential is

$$\Phi(r, \theta, \phi) = -\frac{2q}{4\pi\epsilon_0 r} \sum_{s=1}^{\infty} \left(\frac{a}{r}\right)^{2s} P_{2s}(\cos \theta).$$

Do you agree?