

Physics 3700
Problem Set 3
Due Monday, October 15, 2018

- 1) Taylor P3.22, page 83.
- 2) Taylor P3.24, page 83.
- 3) Taylor P3.28, page 85.
- 4) Taylor P3.46, page 90.

5) In the Bohr theory of the structure of the hydrogen atom the energies of the various quantum states are given by:

$$E_n = - \frac{me^4}{2N^2\hbar^2}$$

With: m the mass of the electron
 e the electric charge of the electron
 \hbar Planck's constant divided by 2π

If: $\sigma_m/m = 0.1\%$ (i.e. the mass is known to 0.1%)
 $\sigma_e/e = 0.2\%$ (i.e. the charge is known to 0.2%)
 $\sigma_{\hbar} / \hbar = 0.1\%$

- a) Calculate σ_E/E for arbitrary N .
- b) If the precision of σ_E/E is to be improved which of the three quantities should be determined more precisely?