Homework 4

1. (5 points) Derive general expression for $\Delta_n$

2. (15 points) Derive the general expression for $|\tilde{\Psi}_n>$.

3. (10 points) Using natural units $c = 1$ and $\hbar = 1$ express $1$ kg, $1$ sec and $1$ m in MeV.

4. (10 points) Derive $|\Psi_n^{(1)}>.$

5. (15 points) Derive $\Delta_n^{(1)}$ and $\Delta_n^{(2)}$.

6. (15 points) Derive $|\Psi_n^{(2)}>.$

7. (20 points) Calculate the energy of the harmonic oscillator perturbed by $\frac{1}{2} \lambda x^2$ up to the first order approximation and relate it to the exact solution.