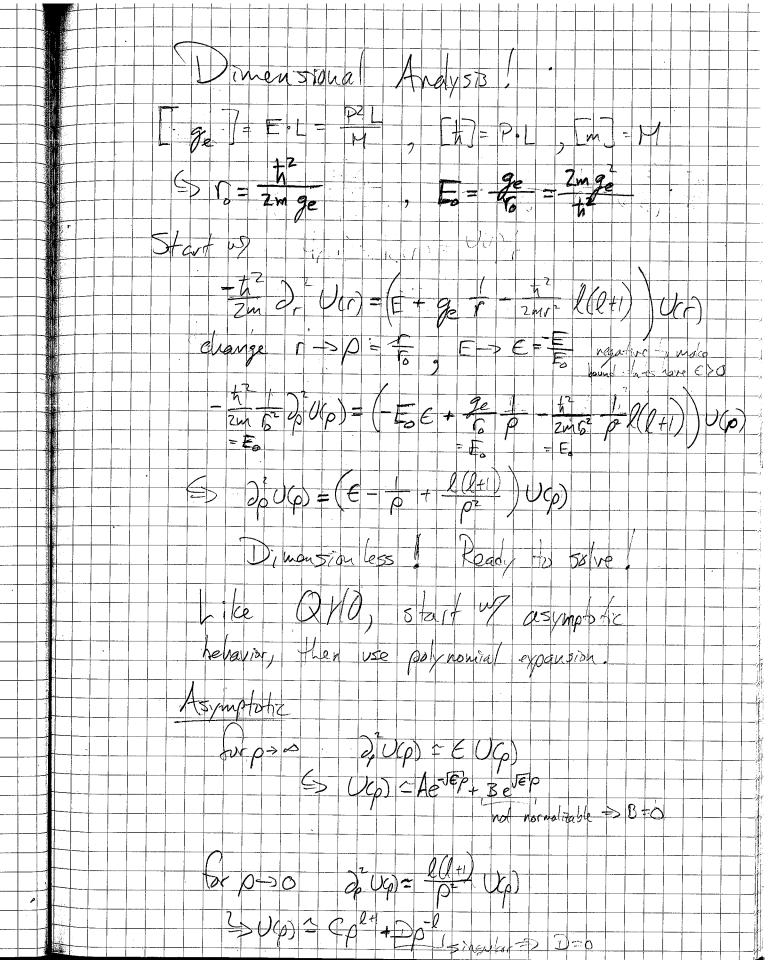
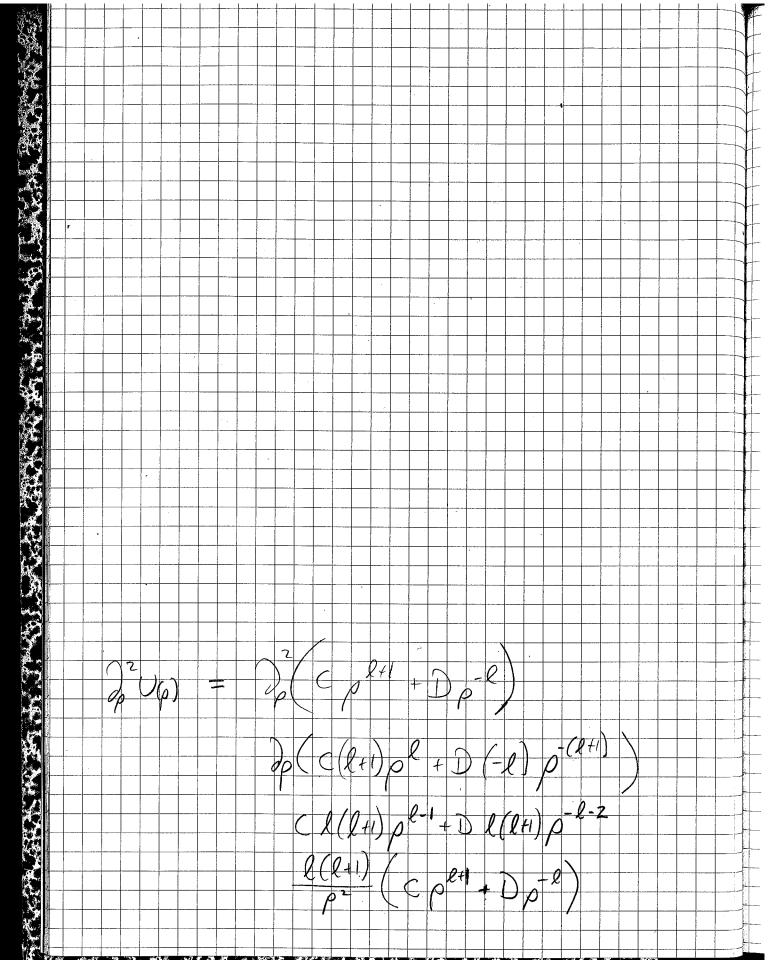
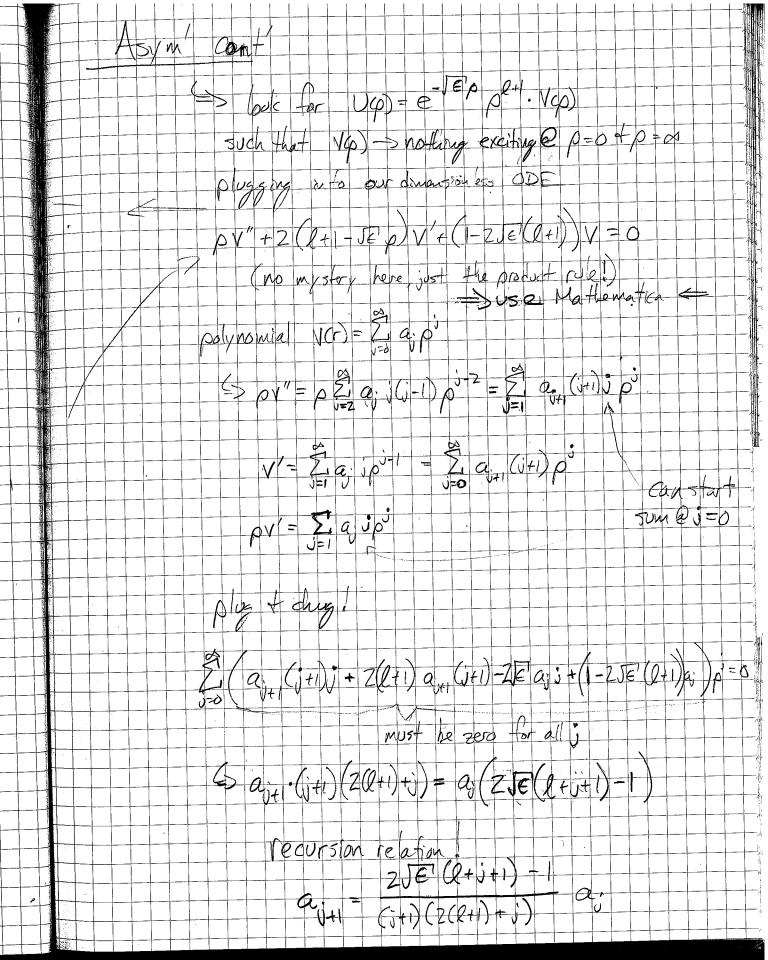
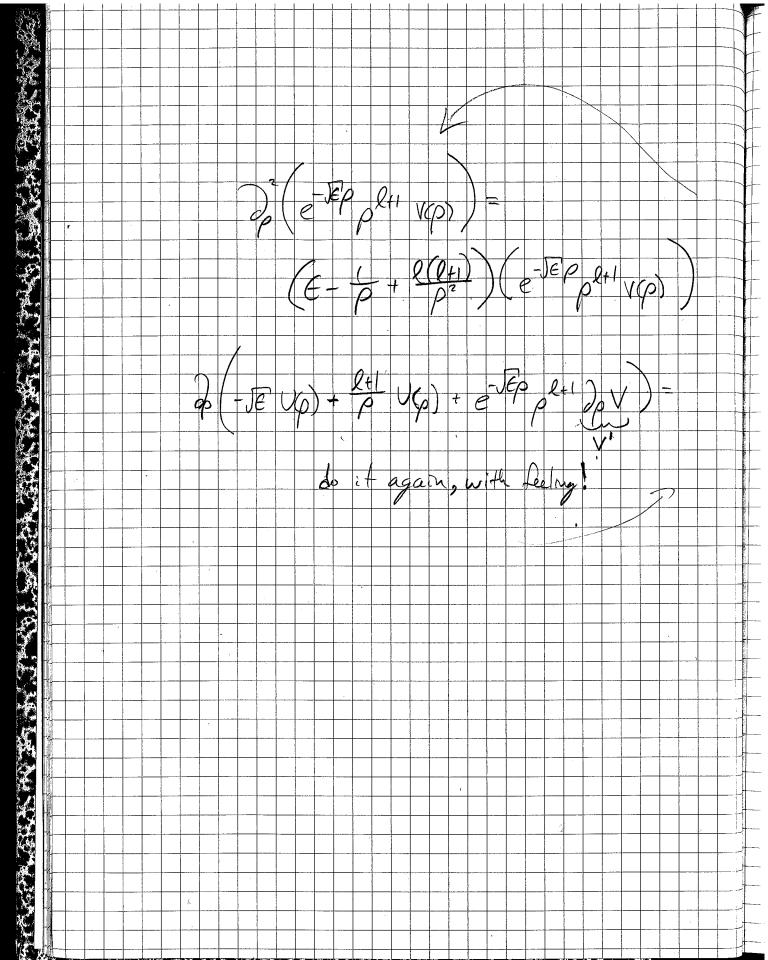
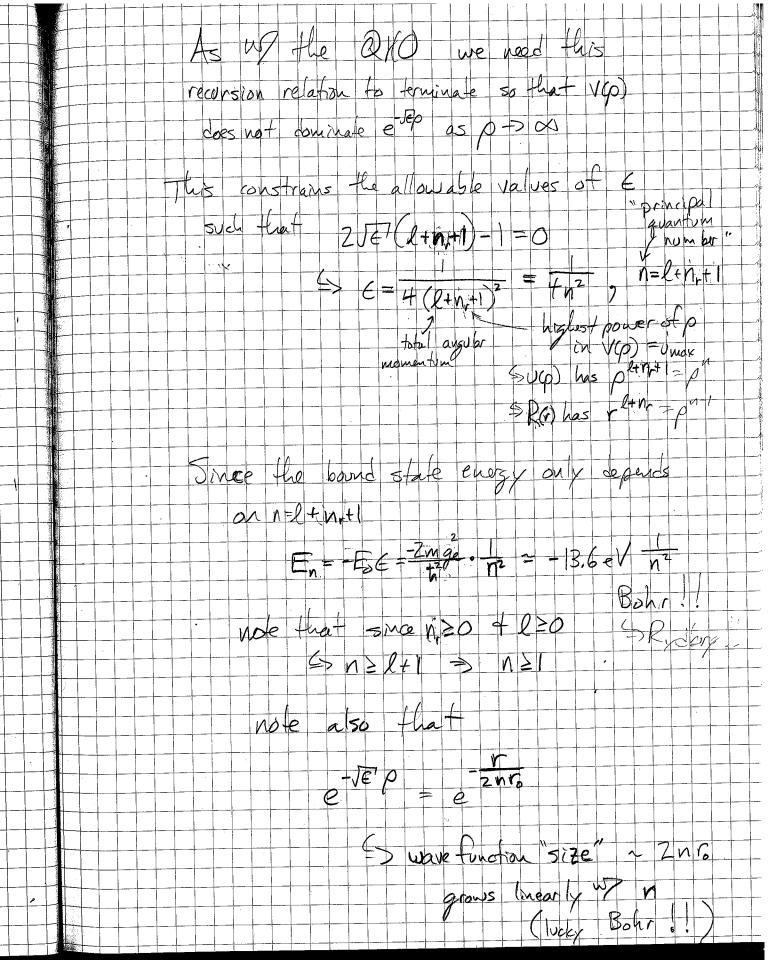
ectore ast ITE entral Patentals P(r) = R(r) /em(0,4) Er P(r) = (-ti² / 2 + ti² / (+1) + V(r)) P(r) radial Function trick! $E_{U(r)} = \left(-\frac{1}{2m}\partial_r + \sqrt{2m}(r)\right)U(r)$ just like in 1D and we saw how some of our old friends (ISW, QNO) be come complicated by the addition of the interminate effective potential Choloring Gr. 4.2. The Contomb polential Use ful for attration retween charged particles of Four proton + electron) ((1) = - e? 1 = -ge

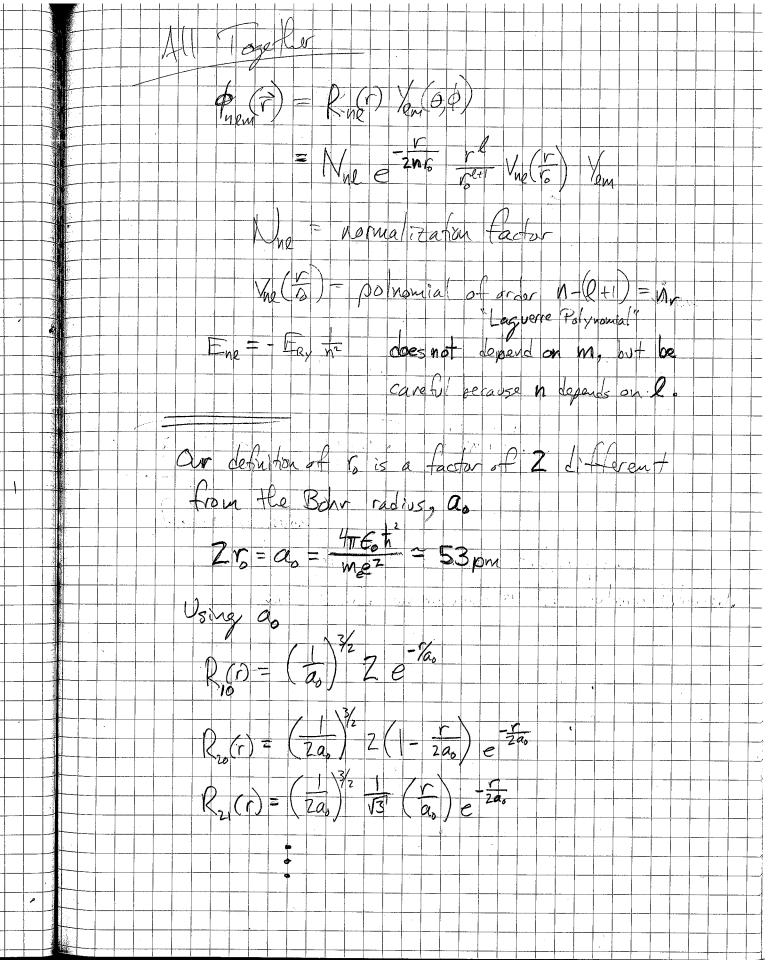












De gen vaey We have a lot of degenoring here The grand state is unique w n=, l=0, m=0 =,= -== +> Mr =0 for principal Quantum number 2 N=2 $N_{r}=1, R=0, m=0$ E= #E. Nr = 0, R=1, M= II, O tor N=3 n=2, l=0, m=0 E3= 4 E, Mr=1, 2=1, m= =1, 0 $N_{r} = 0, Q = 2, m = \pm 2, \pm 1, 0$ desen eracy goes as Symmetry? Constant of motion? Yes! in to potential elliptical proits don't precess. Mathematically, one can define an operator based on the classical Lenz vector A which commutes with & (in 1, 17=0)

3 This Myovozen & not quite, for lots of little reasons Using the Carlous potential would man that the proton is tixed in space @ v = 0. Instead both et and pt move around the CM, which is fixed. As in Classical Mehanics We can account for this by replacing the mass of the "orbiting" particle by its reduced mass. m > 1 = me mp = 0.9995 me not reduced by much! Relativistic Corrections FRC = E - 414 but c2 3 big, so A = is small leads to "Fine Structure 5pm 5pm Intraction both e and p+ have an intrinsic angular momentum ralled "Spin" which we will talk about next time. A charged particle of spin has a B-Reld... these interact!

ly this of Mydrogen Does the electron orbit? NO! (well, may be ...) Does X move (classically). Is best interpreted in QM as is 2(F)=0? For any energy eigenstate, 2 (1)=0, so an ein a state from does NOT move (classically). On the other hand, the probability current JCT) may not be zero... so QMally speaking, something moves. No motion => no radiation => classical death Q: How do we get the emmission spectrum? NU = AE = En = En (1/2 - 1/2) and a superposition of states of Eng of En will have $\frac{E_{n_2}}{h}t + \frac{E_{n_3}}{h}t + \frac{E_{n_4}}{h}t$ 27 = (4) +14) = (2 e wit + 4 e in +1 +1) = (4) 2/4/2/4 /4/2/4/2/4/2/W)t + (4, 1 / 4) e - o (w-w,) +

= 29/7/42 since 4, 4 & ETR = </ also $\langle q, |\hat{r}| q \rangle = 0$ for all quemely symmetry of tem $\langle r \rangle = \langle r \rangle_{12} \left(e^{i(\omega_z - \omega_z)t} + e^{-i(\omega_z - \omega_z)t} \right)$ = 2 (r)2 cos (AW +) so we get no for wy frequency $\Delta W = \frac{E_{N_2} - E_{N_1}}{t_1} = \frac{E_{R_V}}{t_1} \left(\frac{1}{N_1^2} - \frac{1}{N_2^2} \right) = 2\pi V_{\text{rad}}$ which sounds right, but there are no photous, and nothing like Maxwell's egus in av model!! Need OFT Br that, Next time hour to deal with small corrections and finally, spon and other strange features of Q1