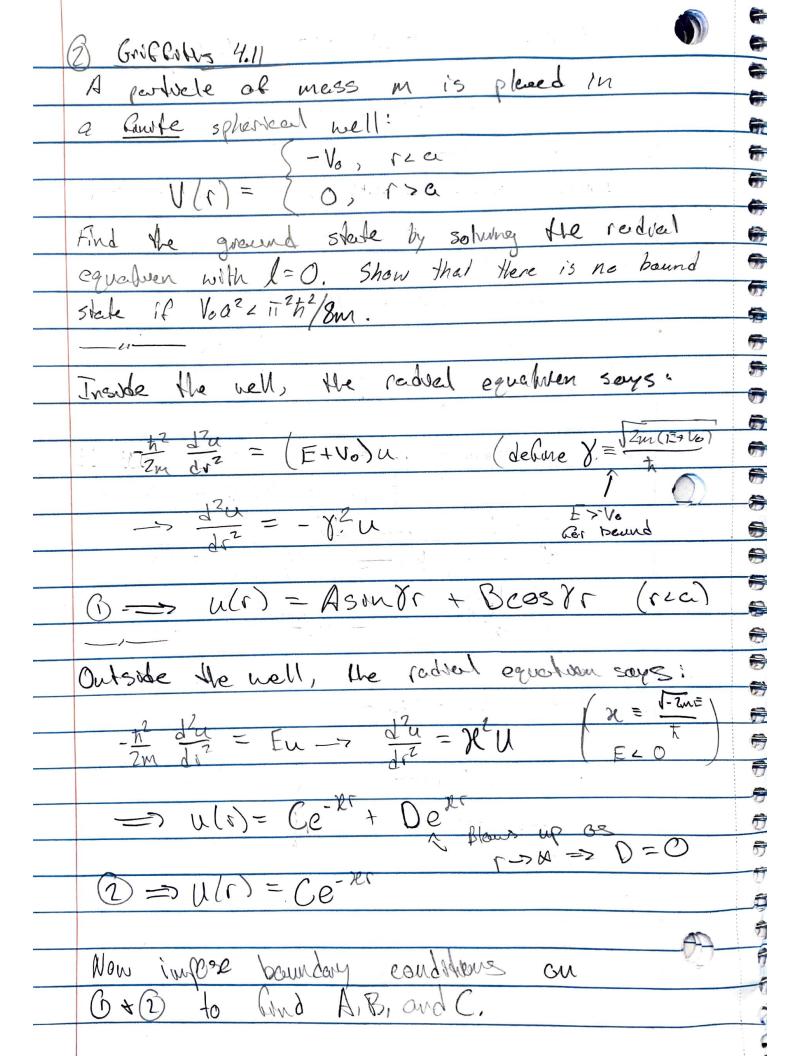
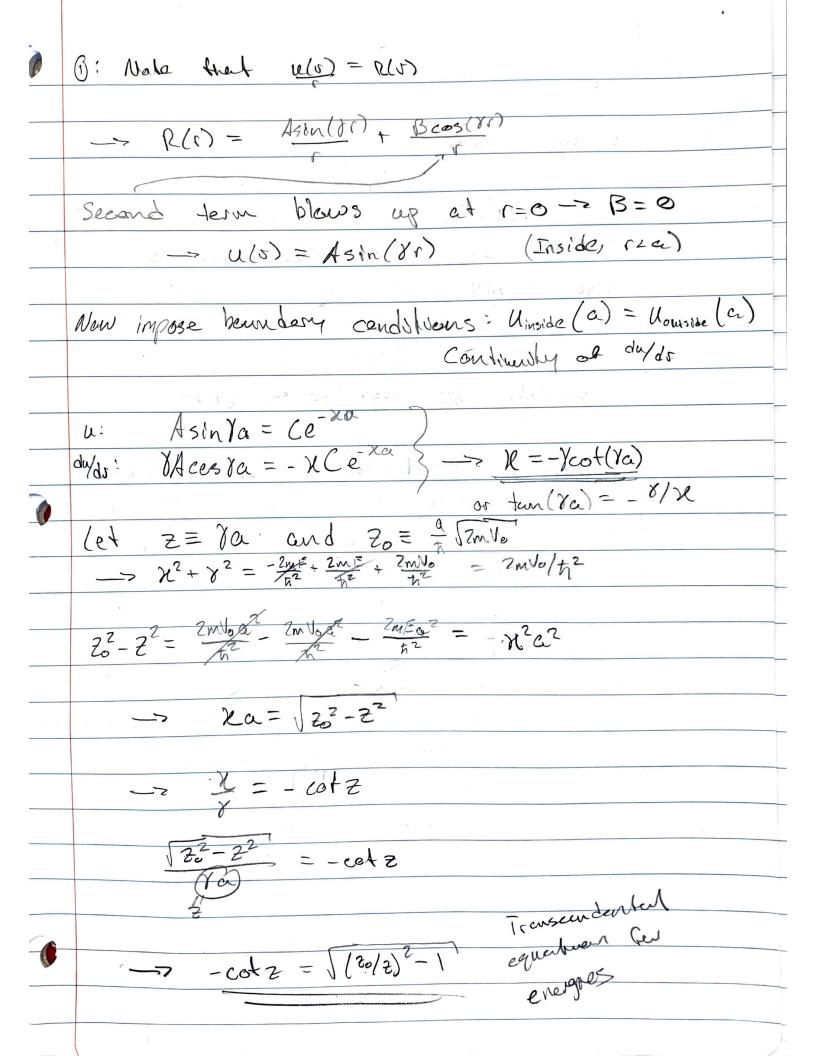
Trow McCoffrey Phys 327 AWY 1) GNCAINS 4.4 Use equations: $P_{1}^{m} = (-1)^{m} (1 - \chi^{2})^{m/2} \left(\frac{d}{dx}\right)^{m} P_{1}(x)$ $P_{1}(x) = \frac{1}{2^{2} l!} \left(\frac{d}{dx}\right)^{2} (\chi^{2} - 1)^{d}$ 5 C 0 $V_{\lambda}(\theta, \phi) = \sqrt{\frac{(2l+1)(l-m)!}{4\pi}} e^{im\phi} P_{\ell}^{m}(\cos\theta)$ 0 to construct the spherical harmonics to and 12. Check that they are normalized and orthogenal. Y0 = \(\frac{1}{4\pi} \land \(\land \cos \text{(cos \ $\int |V_0|^2 dx = \frac{1}{4\pi} \int \sin \theta d\theta \int d\theta = \frac{1}{4\pi} (2)(2\pi) = 1$ $V_{1=2}^{m=1} = \frac{[2(2)+1]}{4\pi} \frac{(2-1)!}{(2+1)!} e^{i\phi} P_{e=2}^{m=1} (\cos\theta) = \frac{5}{4\pi} \frac{1}{6} e^{i\phi} P_{e=2}^{m=1}$ 1 $= \sqrt{\frac{5}{24\pi}} e^{i\phi} (-1)' (1 - \cos^2 \theta)'^2 \left(\frac{d}{d\omega}\right) l_2(\cos \theta)$ 1 $= -\frac{1}{24\pi} e^{i\phi} (1 - (05^{\circ}\theta))^{1/2} \frac{d}{d(050)} \frac{1}{2^{2}2!} \frac{d}{d(050)} (\cos^{2}\theta - 1)^{2}$ $= -\frac{1}{8} \int_{200}^{50} e^{i\theta} \left[1 - \cos^2 \theta \right] \frac{d}{d(\omega \cdot \theta)} \left[\frac{d}{d(\omega \cdot \theta)} \right] \frac{d}{d(\omega \cdot \theta)} \left[\cos \theta \right] \left(\cos^2 \theta - 1 \right)$ 1 = - 1 5 et 1-cos 9 d 12cos 9 -4 = - 1 /2 e10 (1-cos26) 24 co=s6 -> V=2 (0,0) = - 15 eib 1-cos20 cos0 = - 15 eidsin0cos0

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1	Orthogonalisty:
7	
7 9	= 4 (15) - 1 -> 12 is normalized.
3	
P	1 2 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -
4 }	
	$=\frac{15}{4}\int_{-1}^{1}(1-u^{2})u^{2}du=\frac{15}{4}\int_{-1}^{1}u^{2}-u^{2}du$
	(2-1) Q
	= (5) (2x)) (1-cos 6) cos 5 smb de du- 45/1080
	0500=M
7.9	11/12/2 = (8/1) (8/8 dp) 5/4 30/00/00 0
9	25
R	





 $COAZO = O \longrightarrow ZO = \frac{\Lambda IT}{2}$ Ground state: Zo = 17/2 Note that if Zo LT/2, there will be no intersection in the transcendental Egyatuen and have there are no bound energies: No bennd stelle it: \frac{a}{\pi} \frac{7}{2mV_0} \leq \frac{\pi}{2} \rightarrow \frac{\pi}{2} \rightarrow \frac{\pi}{2m} \righta IB Here is a hound state energy, then Z is between 11/2 and Ti= (2= ra) Z=80 -> 11 = 12m(E+Vo) a-> E = 12+2 - Vo 11 = 12m(E+Ve) a -> E = 17th - Ve

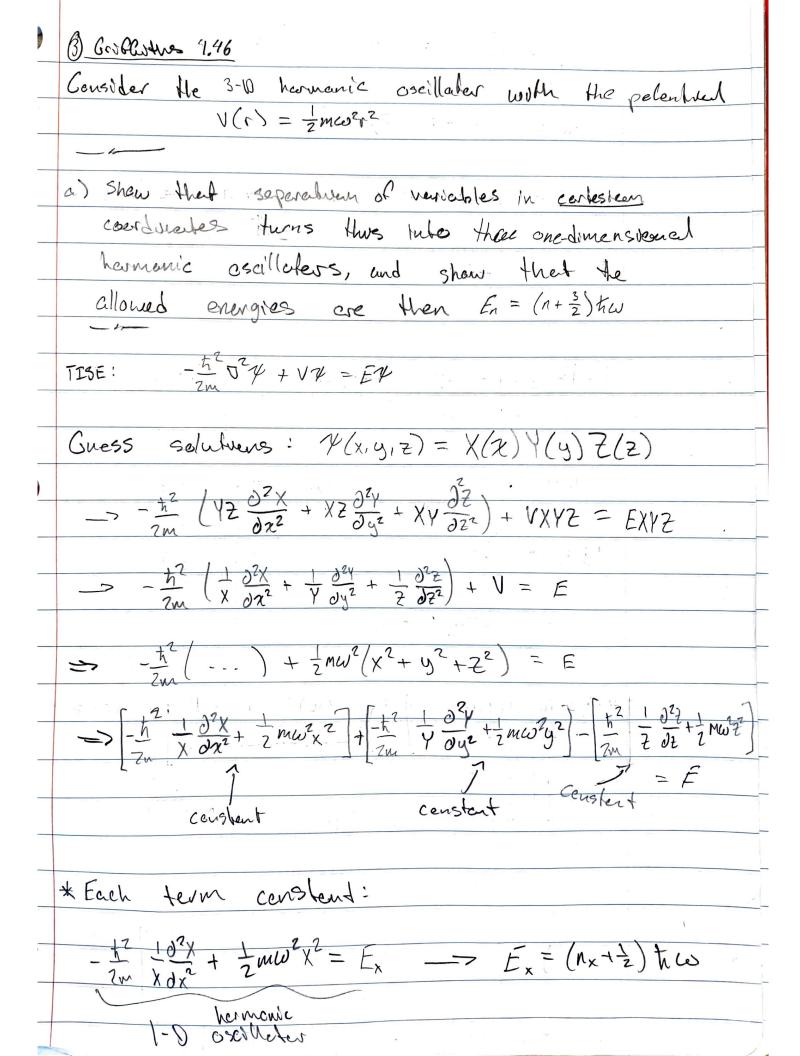
9

0

0

P

=> The ground state everyoes fell in the renge:



Simborly Ger & and Z' - \frac{h^2}{7m} \frac{1}{0y^2} + \frac{1}{7}mw^2y^2 = \text{Fy} - \text{Fy} = (n_y + \frac{1}{2}) \text{fw} - 12 1 22 + 2 mw2 22 = Ez = (n2 +2) ha => E= Ex+Ey+Fz = (nx +ny+nz+3) tw E= (n+2) tree 0 0 b) Potermine the degeneracy d(n) of the energies En. 0 1 = (0) d(z) =Ny n_{x} nz 1/(1) = 3 => d(z)=6 2(3): d(n): 1x=11-7 /y=12=8 nx ny 1/2 Nx = N-1 -> My=1 and Nz=0 Or 1/y=0 and Nz=1 3. $n_{\times} = n_{-2} - \frac{1}{2} \frac{n_y}{n_z} \frac{n_z}{n_z}$ 2 Mx = 0 -> Ny/nz NY $d(n) = 1 + 2 + ... + N + 1 = d(n) = \frac{(n+1)(n+2)}{1}$