

**Worksheet # 13**

Wednesday, March 6, 2024

**Name****Question (5 pts):**

From the 0<sup>th</sup> and 1<sup>st</sup> order expansion of  $|n\rangle_\lambda$ , we found that

$$\langle n^{(0)} | n^{(0)} \rangle = 1, \langle n^{(0)} | n^{(1)} \rangle = \langle n^{(1)} | n^{(0)} \rangle = 0$$

From the 2<sup>nd</sup> order expansion of  $|n\rangle_\lambda$  (i.e.  $|n\rangle_\lambda = |n^{(0)}\rangle + \lambda |n^{(1)}\rangle + \lambda^2 |n^{(2)}\rangle$ ), find the conditions for  $\langle n^{(2)} | n^{(0)} \rangle$ ,  $\langle n^{(1)} | n^{(1)} \rangle$ , at which the orthonormalization condition  ${}_\lambda \langle n | n \rangle_\lambda = 1$  holds.