

$$[2.1] \quad \langle 0 | n \rangle = \{ \langle u | \frac{1}{\sqrt{2}} - \langle d | \frac{1}{\sqrt{2}} \} \{ \frac{1}{\sqrt{2}} | u \rangle + \frac{1}{\sqrt{2}} | d \rangle \} = \frac{1}{2} + 0 + 0 - \frac{1}{2} = 0 \checkmark$$