

$$(3.6) b) \begin{pmatrix} 1 & \sqrt{8} & \sqrt{m-8-1} \end{pmatrix} \begin{pmatrix} 1 \\ \sqrt{8} \\ \sqrt{m-8-1} \end{pmatrix} \xrightarrow{|n\rangle} = 1+8+(m-8-1) = m$$

$$|\tilde{n}\rangle = \frac{1}{\sqrt{m}} |n\rangle$$

$$(3.7) a) \langle N_1 | \psi \rangle = \frac{1}{2\sqrt{6}} (1+i) + (m-1-i) - 1+i = \frac{1}{2\sqrt{6}} (1+i)$$

$$\langle N_2 | \psi \rangle = \frac{1}{2\sqrt{6}} ((1+i) - (1-i) + 1-i) = \frac{1}{2\sqrt{6}} (-1+i)$$

$$\langle N_3 | \psi \rangle = \frac{1}{2\sqrt{6}} ((1+i) + (1-i) + 1-i) = \frac{1}{2\sqrt{6}} (3-i)$$

$$\langle N_4 | \psi \rangle = \frac{1}{2\sqrt{6}} ((1+i) - (1-i) + 1+i) = \frac{1}{2\sqrt{6}} (1+3i)$$

$$|\psi\rangle = \frac{1}{2\sqrt{6}} ((1+i) |N_1\rangle + (-1+i) |N_2\rangle + (3-i) |N_3\rangle + (1+3i) |N_4\rangle)$$

$$(3.74) a) |\langle j|0\rangle|^2 = \langle 0|j\rangle \langle j|0\rangle = |j|^2$$

$$p_0 = 1^2 = 1$$

$$p_{-1} = 0^2 = 0$$

$$b) p_0 = \left(\frac{2}{\sqrt{2}}\right)^2 = \frac{1}{2}$$

$$p_1 = \left(\frac{1}{\sqrt{2}}\right)^2 = \frac{1}{2}$$

$$(3.15) a) p_+ = \left(\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix} \right)^2 = \left(\frac{1}{\sqrt{2}} \right)^2 = \frac{1}{2}$$

$$p_- = \left(\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & -1 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix} \right)^2 = \left(\frac{1}{\sqrt{2}} \right)^2 = \frac{1}{2}$$

$$b) p_+ = \left(\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \end{pmatrix} \frac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ 1 \end{pmatrix} \right)^2 = \left(\frac{1}{2} (1+1) \right)^2 = 1^2 = 1$$

$$p_- = \left(\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & -1 \end{pmatrix} \frac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ 1 \end{pmatrix} \right)^2 = \left(\frac{1}{2} (1-1) \right)^2 = 0$$

$$(3.79) d) \mu_0 = \frac{1}{2} (1 - i\sqrt{3}) \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} (1 \ 0) \frac{1}{2} \begin{pmatrix} 1 \\ i\sqrt{3} \end{pmatrix} =$$

$$= \frac{1}{4} \cdot 1 = \frac{1}{4}$$

$$\mu_1 = \frac{1}{2} (1 - i\sqrt{3}) \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} (0 \ 1) \frac{1}{2} \begin{pmatrix} 1 \\ i\sqrt{3} \end{pmatrix} = \frac{1}{4} (-i\sqrt{3} \cdot i\sqrt{3}) =$$

$$= \frac{1}{4} (-i^2 \cdot 3) = \frac{1}{4} \cdot 3 = \frac{3}{4}$$

$$(3.15) d) \mu_+ = \frac{1}{2} (1 - i\sqrt{3}) \frac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\frac{1}{\sqrt{2}} (1 \ 1) \frac{1}{2} \begin{pmatrix} 1 \\ i\sqrt{3} \end{pmatrix} = \frac{1}{8} [(1 - i\sqrt{3})(1 + i\sqrt{3})] = \frac{1}{8} (1^2 - (i\sqrt{3})^2) =$$

$$= \frac{1}{8} (1 + 3) = \frac{4}{8} = \frac{1}{2}$$

$$\mu_- = \frac{1}{2} (1 - i\sqrt{3}) \frac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ -1 \end{pmatrix} \frac{1}{\sqrt{2}} (1 \ -1)$$

$$\frac{1}{2} \begin{pmatrix} 1 \\ i\sqrt{3} \end{pmatrix} = \frac{1}{8} [(1 + i\sqrt{3})(1 - i\sqrt{3})] = \frac{1}{2}$$