

$$|ket\rangle = \begin{bmatrix} 1-2i \\ 1i \\ -1i \end{bmatrix} \quad (1)$$

$$\langle bra| = [\quad 1+2i \quad -1i \quad 1i \quad] \quad (2)$$

$$|ket\rangle = \begin{bmatrix} 6 \\ 3-1i \\ 5 \end{bmatrix} \quad (3)$$

$$\langle bra| = [\quad 6 \quad 3+1i \quad 5 \quad] \quad (4)$$

$$\begin{pmatrix} 1 & 3i & 0 \\ 0 & -1i & 0 \\ 2-5i & 0 & 1 \end{pmatrix} \quad (5)$$