

## $2^n$ テンソル積ベクトル空間

$C^2$  の  $n$  個のベクトル  $V := C^2 \otimes \dots \otimes C^2$

$$|x_i\rangle = x_{i0}|0\rangle + x_{i1}|1\rangle, \quad (i = 1, \dots, n)$$

テンソル積  $|x_i, \dots, x_n\rangle$

共役転置  $\langle x_i, \dots, x_n|$

$$\langle x| := |x\rangle^*$$

$n = 2$

$$|0\rangle_2 = |0, 0\rangle = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \quad |1\rangle_2 = |0, 1\rangle = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix},$$

$$|2\rangle_2 = |1, 0\rangle = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix}, \quad |3\rangle_2 = |1, 1\rangle = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix},$$

$$\langle 0|_2 = \langle 0, 0| = (1 \ 0 \ 0 \ 0), \quad \langle 1|_2 = \langle 0, 1| = (0 \ 1 \ 0 \ 0)$$

$$\langle 2|_2 = \langle 1, 0| = (0 \ 0 \ 1 \ 0), \quad \langle 3|_2 = \langle 1, 1| = (0 \ 0 \ 0 \ 1)$$

内積  $\langle x|y\rangle$

複素数  $a$  との積  $a|x\rangle$