1 Quantum gates

$|A\rangle = \alpha|0\rangle + \beta|1\rangle$ with $\alpha, \beta \in \mathrm{C}$

$\langle A| = \bar{\alpha}\langle 0| + \bar{\beta}\langle 1| = |A\rangle^\dagger$

$\langle 0|A\rangle = \alpha \qquad \langle 1|A\rangle = \beta$

$$|0\rangle = \begin{pmatrix}1\\0\end{pmatrix} \qquad |1\rangle = \begin{pmatrix}0\\1\end{pmatrix} \qquad |-\rangle = \frac{1}{\sqrt{2}}(|0\rangle - |1\rangle) \qquad |+\rangle = \frac{1}{\sqrt{2}}(|0\rangle + |1\rangle)$$

$$\sigma_x = \begin{pmatrix}0 & 1\\1 & 0\end{pmatrix} \qquad \sigma_y = \begin{pmatrix}0 & -i\\i & 0\end{pmatrix} \qquad \sigma_z = \begin{pmatrix}1 & 0\\0 & -1\end{pmatrix} \qquad H = \frac{1}{\sqrt{2}}\begin{pmatrix}1 & 1\\1 & -1\end{pmatrix}$$

Gates	$\|0\rangle$	$\|1\rangle$	$\|-\rangle$	$\|+\rangle$
σ_x	$\|1\rangle$	$\|0\rangle$	-$\|-\rangle$	$\|+\rangle$
σ_y	i$\|1\rangle$	-i$\|0\rangle$	i$\|+\rangle$	-i$\|-\rangle$
σ_z	$\|0\rangle$	-$\|1\rangle$	$\|+\rangle$	$\|-\rangle$
H	$\|+\rangle$	$\|-\rangle$	$\|1\rangle$	$\|0\rangle$

$$\sigma_x\sigma_y = \begin{pmatrix}i & 0\\0 & -i\end{pmatrix} = i\sigma_z \qquad \sigma_y\sigma_z = \begin{pmatrix}0 & 1\\-1 & 0\end{pmatrix} = i\sigma_x \qquad \sigma_z\sigma_x = \begin{pmatrix}0 & i\\i & 0\end{pmatrix} = i\sigma_y$$

$$\sigma_y\sigma_x = -\sigma_x\sigma_y \qquad \sigma_z\sigma_y = -\sigma_y\sigma_z \qquad \sigma_x\sigma_z = -\sigma_z\sigma_x$$

$\sigma_x^2 = \sigma_y^2 = \sigma_z^2 = H^2 = \mathrm{I}$

$\sigma_x\sigma_y\sigma_z = i\,\mathrm{I}$ $\qquad \sigma_y\sigma_z\sigma_x = i\,\mathrm{I}$ $\qquad \sigma_z\sigma_x\sigma_y = i\,\mathrm{I}$

$\sigma_x\sigma_z\sigma_y = -i\,\mathrm{I}$ $\qquad \sigma_y\sigma_x\sigma_z = -i\,\mathrm{I}$ $\qquad \sigma_z\sigma_y\sigma_x = -i\,\mathrm{I}$