

## ❖ Reference sheet

### 1.1 Common gates

$$X := \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \quad Y := \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix} \quad Z := \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \quad (1)$$

$$H := \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad R_\theta := \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix} \quad S := \begin{bmatrix} 1 & 0 \\ 0 & i \end{bmatrix} \quad T := \begin{bmatrix} 1 & 0 \\ 0 & e^{i\pi/4} \end{bmatrix} \quad (2)$$

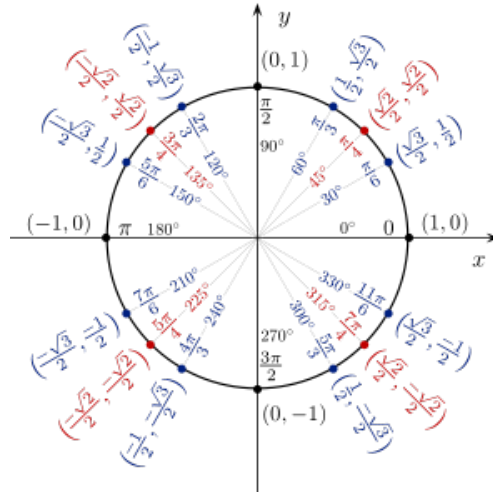
### 1.2 Common Shorthands

$$|+\rangle := \frac{1}{\sqrt{2}}(|0\rangle + |1\rangle) \quad |-\rangle := \frac{1}{\sqrt{2}}(|0\rangle - |1\rangle) \quad (3)$$

$$|i\rangle := \frac{1}{\sqrt{2}}(|0\rangle + i|1\rangle) \quad |-i\rangle := \frac{1}{\sqrt{2}}(|0\rangle - i|1\rangle) \quad (4)$$

$$|\theta\rangle := \cos \theta |0\rangle + \sin \theta |1\rangle \quad (5)$$

### 1.3 Unit circle



❖ **Scratch paper**