```
pip install qiskit
```

```
Requirement already satisfied: qiskit in /usr/local/lib/python3.10/dist-packages (1.2.0)
Requirement already satisfied: rustworkx>=0.15.0 in /usr/local/lib/python3.10/dist-packages (from qiskit) (0.15.1)
Requirement already satisfied: numpy<3,>=1.17 in /usr/local/lib/python3.10/dist-packages (from qiskit) (1.26.4)
Requirement already satisfied: scipy>=1.5 in /usr/local/lib/python3.10/dist-packages (from qiskit) (1.13.1)
Requirement already satisfied: sympy>=1.3 in /usr/local/lib/python3.10/dist-packages (from qiskit) (1.13.2)
Requirement already satisfied: dill>=0.3 in /usr/local/lib/python3.10/dist-packages (from qiskit) (0.3.8)
Requirement already satisfied: python-dateutil>=2.8.0 in /usr/local/lib/python3.10/dist-packages (from qiskit) (2.8.2)
Requirement already satisfied: stevedore>=3.0.0 in /usr/local/lib/python3.10/dist-packages (from qiskit) (5.3.0)
Requirement already satisfied: typing-extensions in /usr/local/lib/python3.10/dist-packages (from qiskit) (4.12.2)
Requirement already satisfied: symengine>=0.11 in /usr/local/lib/python3.10/dist-packages (from qiskit) (0.11.0)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.8.0->qiskit) (1.16.0)
Requirement already satisfied: pbr>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from stevedore>=3.0.0->qiskit) (6.1.0)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.10/dist-packages (from sympy>=1.3->qiskit) (1.3.0)
```

```
pip install pylatexenc
```

```
Requirement already satisfied: pylatexenc in /usr/local/lib/python3.10/dist-packages (2.10)
```

Theta 1 : pi/6

Theta 2 : -pi/8

Theta 3 : pi/2

Theta 4 : pi/7

```python
import numpy as np
theta = np.array([[np.pi/6],[-np.pi/8],[np.pi/2],[np.pi/7]])

MT =np.array([[1,1,1,1],[1,-1,1,-1],[1,-1,-1,1],[1,1,-1,-1]])
MT=0.25*MT
a = np.matmul(MT,theta)
[[a1],[a2],[a3],[a4]]= a
a1
```
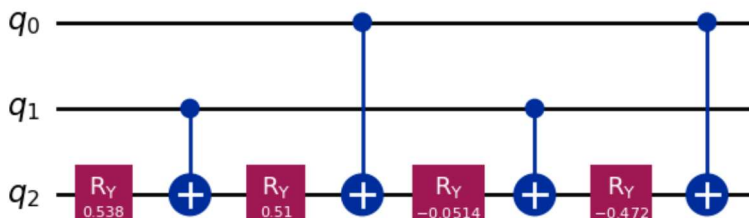
```
0.5376237428018247
```

```python
from qiskit import QuantumCircuit
qc = QuantumCircuit(3)

qc.ry(a1,2)
qc.cx(1,2)
qc.ry(a2,2)
qc.cx(0,2)
qc.ry(a3,2)
qc.cx(1,2)
qc.ry(a4,2)
qc.cx(0,2)
qc.draw("mpl")
```



```python
qc1 = QuantumCircuit(3)
qc1.x(0)
qc1.x(1)
qc1.cry(np.pi/12,1,2)
qc1.cx(0,2)
qc1.cry(-np.pi/12,1,2)
qc1.cx(0,2)
qc1.x(0)
qc1.x(1)
qc1.barrier()
```

```
qc1.x(0)
# qc1.x(1)
qc1.cry(-np.pi/16,1,2)
qc1.cx(0,2)
qc1.cry(np.pi/16,1,2)
qc1.cx(0,2)
qc1.x(0)
# qc1.x(1)
qc1.barrier()
# qc1.x(0)
qc1.x(1)
qc1.cry(np.pi/4,1,2)
qc1.cx(0,2)
qc1.cry(-np.pi/4,1,2)
qc1.cx(0,2)
# qc1.x(0)
qc1.x(1)
qc1.barrier()
# qc1.x(0)
# qc1.x(1)
qc1.cry(np.pi/14,1,2)
qc1.cx(0,2)
qc1.cry(-np.pi/14,1,2)
qc1.cx(0,2)
# qc1.x(0)
# qc1.x(1)
qc1.barrier()
qc1.draw("mpl")
```
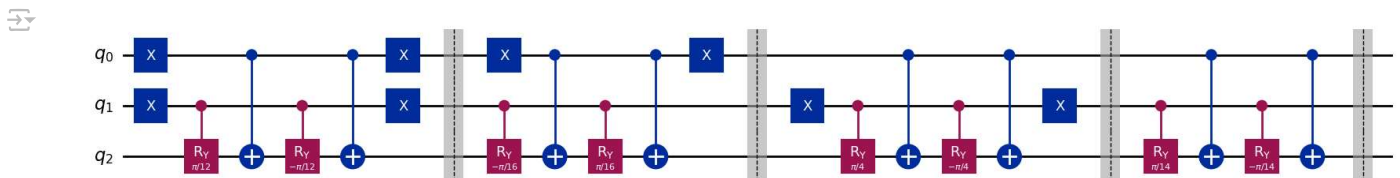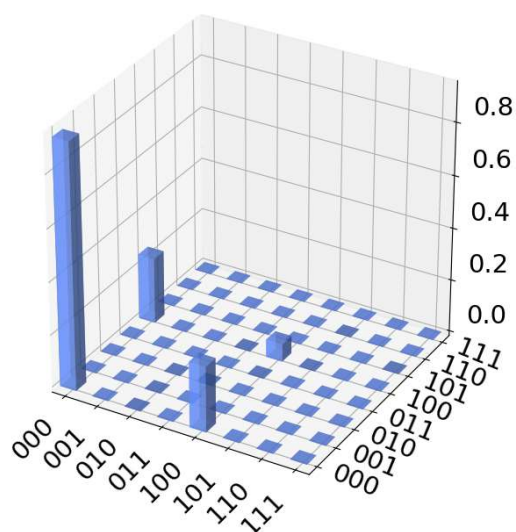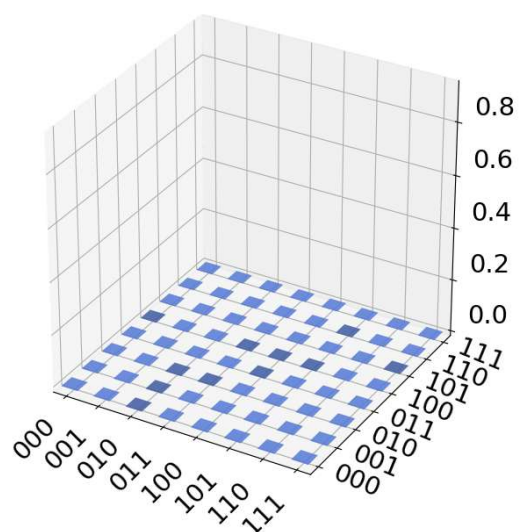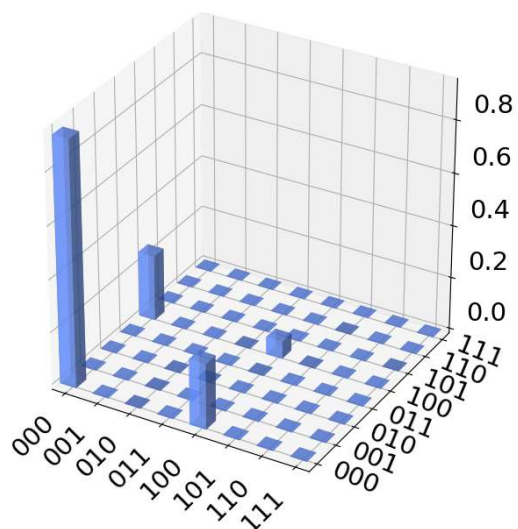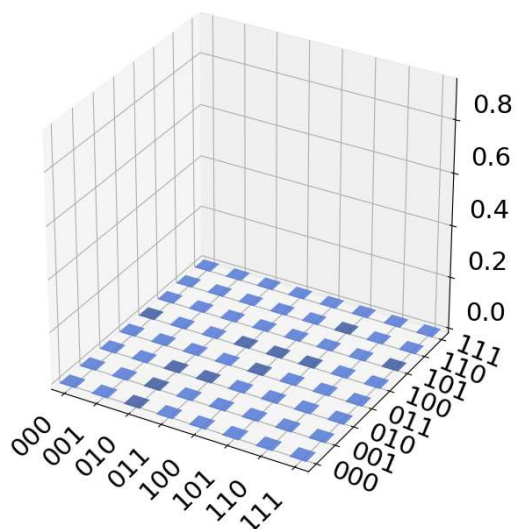


```
from qiskit.visualization import plot_state_city
from qiskit.quantum_info import Statevector
sv1 = Statevector(qc1)
sv2 = Statevector(qc)
```

```
plot_state_city(sv1, alpha=0.6)
```

Real Amplitude (ρ)   Imaginary Amplitude (ρ)


```
plot_state_city(sv2, alpha=0.6)
```

Real Amplitude (ρ)   Imaginary Amplitude (ρ)

```python
# from qiskit.circuit.library import RYGate
# from qiskit.circuit import ControlledGate
# rry1 = RYGate(np.pi/6)
# ccry1 = ControlledGate(name ="cry", num_qubits=3,params=rry1.params,num_ctrl_qubits =2 , definition = rry1.definition,ctrl_state='00',b
# rry2 = RYGate(-np.pi/8)
# ccry2 = ControlledGate(name ="cry", num_qubits=3,params=rry2.params,num_ctrl_qubits =2 , definition = rry2.definition,ctrl_state='10',b
# rry3 = RYGate(np.pi/2)
# ccry3 = ControlledGate(name ="cry", num_qubits=3,params=rry3.params,num_ctrl_qubits =2 , definition = rry3.definition,ctrl_state='01',b
# rry4 = RYGate(np.pi/7)
# ccry4 = ControlledGate(name ="cry", num_qubits=3,params=rry4.params,num_ctrl_qubits =2 , definition = rry4.definition,ctrl_state='11',b

# circ = QuantumCircuit(3)
# circ.append(ccry1,[0,1,2])
# circ.append(ccry2,[0,1,2])
# circ.append(ccry3,[0,1,2])
# circ.append(ccry4,[0,1,2])


# circ.draw("mpl")
```