**Cirq Basics**

**State Representations** [**1**](#_exb19quwqzr9)

**Creating Qubits****2**

**Quantum Circuits** [**3**](#_obaoq19s0qjm)

**Gates and Measurements****3**

# **State Representations**

| **Concept** | **Example** |
| --- | --- |
| Creating a vector. | vec = [1,0]   |
| Putting a vector in ket notation. | cirq.dirac\_notation(vec)   |
| Placing a vector on the Bloch Sphere | bloch\_sphere.BlochSphere(state\_vector = vec)   |
| Finding the final state vector of a quantum circuit. | sv = cirq.final\_state\_vector(my\_circuit)   |
| Creating a histogram of state measurements. **NOTE**: You must specify how many qubits are in your circuit in the part: tick\_label=binary\_labels(NUM QUBITS). | hist = cirq.plot\_state\_histogram(result, plt.subplot(), title = 'Qubit States', xlabel = 'States', ylabel = 'Occurrences', tick\_label=binary\_labels(2))  plt.show()   |

# **Creating Qubits**

| **Concept** | **Example** |
| --- | --- |
| Creating a Named Qubit | my\_qubit = cirq.NamedQubit("q0")   |
| Creating a list of qubits. | my\_qubits = [cirq.NamedQubit(“q0”), cirq.NamedQubit(“q1”), cirq.NamedQubit(“q2”)]   |
| Using the range() method. | my\_qubits = cirq.NamedQubit.range( 3, prefix = “q”)   |

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# **Quantum Circuits**

| **Concept** | **Example** |
| --- | --- |
| Creating a quantum circuit. | my\_circuit = cirq.Circuit()   |
| Simulating a quantum circuit. | sim = cirq.Simulator()  result = sim.run(my\_circuit)  result   |
| Repeating the simulation of a quantum circuit. | sim = cirq.Simulator()  result = simulator.run(my\_circuit, repetitions=10)  results   |

# **Gates and Measurements**

| **Concept** | **Example** |
| --- | --- |
| Adding a measurement to a single qubit. | my\_circuit.append(cirq.measure(my\_qubit))   |
| Adding an X gate to a single qubit. | qc.append(cirq.X(cirq.NamedQubit("q0")))   |
| Adding a Z gate to a single qubit. | qc.append(cirq.Z(cirq.NamedQubit("q0")))   |
| Adding an H gate to a single qubit. | qc.append(cirq.H(cirq.NamedQubit("q0")))   |
| Adding a measurement to each qubit. | my\_circuit.append(cirq.measure(my\_qubits)   |
| Adding a quantum gate to each qubit. | my\_circuit.append(cirq.X.on\_each(my\_qubits)   |
| Adding a CNOT gate to a quantum circuit. | my\_circuit.append(cirq.CNOT(cirq.NamedQubit("q0"), cirq.NamedQubit("q1")))   |