In [1]:
```
from qiskit import QuantumCircuit,Aer,execute
from qiskit.circuit import Gate
from math import pi,sqrt
```

More Circuit Identities

Solutions

Quick Exercises

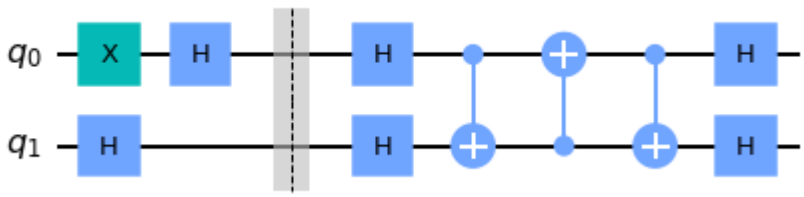
1. Find different circuit that swaps qubits in the states $|+\rangle$ and $|-\rangle$, and show this is equivalent to the circuit shown above.

We have the single qubit gates at our disposal, and can only apply the two qubit gate $CNOT$.

We first prepare our states, qith q_0 in $|+\rangle$ state and q_1 in $|-\rangle$

In [2]:
```
qc = QuantumCircuit(2)
qc.x(0)
qc.h([0,1])
qc.barrier()
qc.h([0,1])
qc.cx(0,1)
qc.cx(1,0)
qc.cx(0,1)
qc.h([0,1])
qc.draw('mpl')
```

Out[2]:



In [3]:
```
backend_s = Aer.get_backend('statevector_simulator')
job = execute(qc,backend_s).result()
sv = job.get_statevector()
```

In [4]:
```
from qiskit_textbook.tools import array_to_latex
```

In [5]:
```
array_to_latex(sv)
```

$$\begin{bmatrix} \frac{1}{2} \\ \frac{1}{2} \\ -\frac{1}{2} \\ -\frac{1}{2} \end{bmatrix}$$

In [6]:
```
import qiskit
qiskit.__qiskit_version__
```

Out[6]:
```
{'qiskit-terra': '0.16.1',
 'qiskit-aer': '0.7.1',
 'qiskit-ignis': '0.5.1',
 'qiskit-ibmq-provider': '0.11.1',
 'qiskit-aqua': '0.8.1',
 'qiskit': '0.23.1'}
```

In [ ]:
```

```