**Quantum Fourier Transform**

* 1. Linear Shift: (https://courses.edx.org/c4x/BerkeleyX/CS191x/asset/chap5.pdf)
* **Input:** Qubit vector of size
* **Precondition:** True
* **Operation:** *QFT* ()

*QFT* (*SHIFT* ()

**Where:** *SHIFT* () =*SHIFT* () =

* **Postcondition:** *PHASE\_SHIFT* **(**

**Where:** *PHASE\_SHIFT* () =

(The only difference between the two output states should be the phase, as identified above)

* 1. QFT, and QFT on less qubits, should be found within QFT (solve smaller problem):
* **Input:** Qubit vector of size
* **Precondition:** True
* **Operation:** *QFT* (

*QFT* ()

* **Postcondition:** = True

**Where:**  () = True

iff =

* 1. The state of the first qubit in QFT is equal to H gate (oracle property)
* **Input:** Qubit vector of size
* **Precondition:** True
* **Operation:** *QFT* (

*H* ()

**Where:** *H* is the Hadamard gate

* **Postcondition:**  =
  1. Applying (QFT ()) is identity.
* **Input:** A random unitary operator
* **Precondition:** True
* **Operation:**

())

* **Postcondition:** 
  1. A specific phase should be induced after QFT is applied to binary bits.
* **Input:** Qubit vector of size
* **Precondition:**

*QFT*

* **Operation:** *QFT* (
* **Postcondition:**

**Where:**

is the binary value of

**NOTE:**  denotes the first qubit of

= =

where H is the Hadamard gate

() = ()