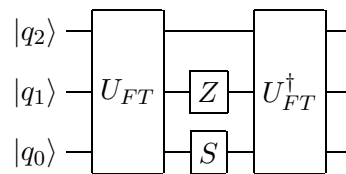# Quantum Computing Epiphany Assignment 4

Q1 Give the inverse for the Quantum Fourier Transform U_{FT}, and give the explicit quantum circuit for the inverse for three qubits.

Q2 Consider a 3-qubit system, and consider the unitary transform $U_{FT}^\dagger S_0 Z_1 U_{FT}$, represented by the quantum circuit below.

Show that this circuit implements the operation $x \to x + 2 \bmod 8$.

Q3 Find the period of the function $f(a) = y^a \bmod N$ for $N = 713$, for some y of your choosing. (I recommend using a computer for doing the exponentials and modular operations involved in finding the period.) If the period is odd, choose again. Use the result to find a prime factor of N.