## Homework 1

Due at 2:30pm, Oct 7. Hand it in to me before class, or send an e-copy in an email to me and the TA.

1. Write down the QFT for , , , .
2. Consider a finite Abelian group with the operation written as “+”. Define a shift operator defined by . Prove that  
   where is the quantum Fourier transform and   is the dual group of , i.e. the set of homomorphisms from to (the multiplicative group of nonzero complex numbers).
3. Suppose is an Abelian group, and is a subgroup of . define  
   Prove that .  
   (*hint*: An Abelian group is isomorphic to its dual group.)