- From Section 14:
  1. Please solve exercise 14.1 (parts b & c) from the textbook.
  2. Using the Fundamental Theorem of Finite Abelian Groups, please show that there are two abelian groups of order 108 that have exactly one subgroup of order 3.
  3. How many abelian groups of order 108 have exactly 4 subgroups of order 3? How do you know?
- From Section 16:
  1. Please solve Exercises 16.4 and 16.9 from the textbook. *Make sure to check that* $(\mathbb{Q}, *, \Box)$ *in 16.4 is a ring first, before checking that it's a field!*
  2. Let $M_2(\mathbb{Z})$ be the ring of all 2×2 matrices with integer entries, and let

$$R = \left\{ \begin{bmatrix} a & a+b \\ a+b & a \end{bmatrix} : a, b \in \mathbb{Z} \right\}.$$

     Is R a subring of $M_2(\mathbb{Z})$?
- From the presentations on Tuesday, November 15:
  1. Let $G = \langle S \rangle$ where $S = \{F, B, L, R, U, D\}$, and let $H =< s >$ for some $s \in S$. Show that H is not normal in G.
  2. James Bond is in trouble. He is being held hostage in a secret underground lair, but luckily since it is the 21st century and he has Verizon, his iPhone works. However, the super villain holding him hostage is watching his texts closely, and he can only communicate to M using RSA encryption. M chooses $p = 23, q = 41$, and $e = 7$ and sends Bond the public key.
     (a) What is the public key that M sends him?
     (b) If Bond encodes the number 4372 (the coordinates of his location), what number will M will receive?
     (c) Calculate a value of f that M can use to decode this number, and show that this f accurately decodes the number.

* Exercise 14.4 in your textbook