

UH - Math 6302/Modern Algebra - Dr. Heier - Fall 2018

HW 3

Due Wednesday, Oct. 17, at the beginning of class.

Use regular sheets of paper, stapled together.

Don't forget to write your name on page 1.

1.

(a) (1 point) Prove that every finitely generated subgroup of  $(\mathbb{Q}, +)$  is cyclic. Hint: You may use without proof the fact that subgroups of cyclic groups are cyclic.

(b) (1 point) Prove that  $(\mathbb{Q}, +)$  is not finitely generated.

2. (2 points) For  $n = 72$ , give a unique representative of each isomorphism class of abelian groups of order  $n$  based on the Fundamental Theorem. Do the same based on the modified Fundamental Theorem as discussed in class. Indicated which isomorphism classes are the same under the two methods. Do the same for  $n = 432$ .

3. (2 points) Section 5.2, Problem 4(c)

4. (2 points) Section 5.5, Problem 1

5. (2 points) Section 5.5, Problem 2