

# Math 113 Homework 7

David Corwin

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There are four problems due Wednesday, April 3.

1. Let  $G$  be an abelian group, and let  $G_p$  be the set of elements of order a power of  $p$ . Show that  $G_p$  is a subgroup of  $G$ .
2. Up to isomorphism, how many abelian groups of size 32 are there? [Hint: use the corollary on p.45 of the notes]
3. Up to isomorphism, how many abelian groups of size 30 are there? [Hint: think about the theorem on p.43 of the notes]
4. Let  $G = \mathbb{Z}^2 \times \mathbb{Z}/32\mathbb{Z} \times \mathbb{Z}/8\mathbb{Z} \times (\mathbb{Z}/4\mathbb{Z})^2$ . For  $n \in \mathbb{N}$ , let  $nG = \{nx \mid x \in G\}$ .
  - (a) What is  $G/2G$ ?
  - (b) What about  $G/5G$ ?