

PMATH 336 Introduction to Group Theory, Exercises for Chapter 6

**1:** For each of the following groups  $G$ , find a group of the form  $\mathbb{Z}_{n_1} \times \mathbb{Z}_{n_2} \times \cdots \times \mathbb{Z}_{n_i}$  with  $n_i | n_{i+1}$  for all  $i$ , which is isomorphic to  $G$ .

(a)  $G = \mathbb{Z}_2 \times \mathbb{Z}_4 \times \mathbb{Z}_5 \times \mathbb{Z}_6 \times \mathbb{Z}_8 \times \mathbb{Z}_9 \times \mathbb{Z}_{12} \times \mathbb{Z}_{18} \times \mathbb{Z}_{25}$ .

(b)  $G = U_{180}$

(c)  $G = U_{60} / \langle 29 \rangle$ .

**2:** (a) List all of the abelian groups of order 1,500.

(b) Determine the number of abelian groups of order 160,000.