MS321 Algebra, tutorial 10

1. What is the structure of the abelian group G/H where $G = \mathbb{Z}_2 \times \mathbb{Z}_3 \times \mathbb{Z}_4$ and H is the subgroup generated by the element $(1, 2, 2)$?

2. If $G = \mathbb{Z}_6 \times \mathbb{Z}_7 \times \mathbb{Z}_8$ what is the order of the subgroup H generated by the subset $\{(2, 2, 2), (2, 4, 6)\}$? What is the structure of G/H?

3. Compute the structure of the abelian groups $\mathbb{Z}_{49}^*$ and $\mathbb{Z}_{50}^*$?

4. Use matrices to give a new proof that $G = \mathbb{Z}_m \times \mathbb{Z}_n$ is cyclic if m and n are coprime. (Compute the structure of G/H where H is the cyclic subgroup generated by $(1, 1)$.)