University of Bahrain Department of Mathematics MATHS311: Abstract Algebra 1 Fall 2017 Dr. Abdulla Eid



Homework 14: Finite Abelian Group and Sylow's theorems Due on January 4, 2018 Hand Problems 1,2, 8, 9

Name: _____

1. Find all finite abelian group (up to isomorphism) of order

1. 360

2. 200

3. 720

2. Let $G = \{1, 9, 16, 22, 29, 33, 74, 79, 81, \}$, where the operation is \cdot_{91} . Write *G* as a direct sum of cyclic groups (primary decomposition).

3. Prove that any group of order 105 is cyclic.

4. Suppose *G* is an abelian group of order 120 and has exactly three elements of order2. Write *G* as a direct sum of cyclic groups (primary decomposition).

5. How many (up to isomorphism) abelian groups of order 6, 15, 35 and in general *pq*?

6. How many (up to isomorphism) abelian groups of order 16 such that x + x + x + x = 0?

7. Find the symmetry group of a nonsquare rectangle and write it as direct sum of cyclic groups (primary decomposition).

8. How many Sylow *p*–subgroups can a group *G* possibly have when

1. p = 3, |G| = 72.

2. p = 5, |G| = 60.

- 9. Prove that there are normal subgroups of groups of order
 - 1. |G| = 42.

2. |G| = 200.

3. |G| = 231.

4. |G| = 255.