Problem 1. **(6 points)**

Some of the groups below are isomorphic to $Z_2 \times Z_{12}$. Enter the indexing number of all groups isomorphic to $Z_2 \times Z_{12}$ into the answer box as a list (e.g. if the 2nd and 3rd group in the following list were the only groups isomorphic to $Z_2 \times Z_{12}$, then you would answer 2,3).

1: Z_{24}

2: Z_{60}

3: $Z^{\times} \times Z_{12}$

4: $Z_{12} \times Z_2$

5: $Z_{2^3} \times Z_3$

6: $U_5 \times Z_6$

7: $GL_2(Z_2)$

8: $Z_2 \times Z_2 \times Z_6$

9: $Z_6 \times Z_4$

____

Answer(s) submitted:

- $3,4,6,9$

submitted: (correct)
recorded: (correct)

Problem 2. **(4 points)**

What is the order of the coset containing $\begin{bmatrix} 3 & 1 \\ 0 & 1 \end{bmatrix}$ as an element of the quotient group $GL_2(\mathbb{Z}_5)/SL_2(\mathbb{Z}_5)$? (Note, here "order" means the order of the element in the group, in the sense of page 198 in the textbook, not the cardinality of coset.) ____

Answer(s) submitted:

- 4

submitted: (correct)
recorded: (correct)

Problem 3. **(4 points)**

Let r be a rotation of $\frac{2\pi}{10}$ in D_{10}, and s be any reflection. Compute the order of sr^9s. Answer: ____

Answer(s) submitted:

- 10

submitted: (correct)
recorded: (correct)

Problem 4. **(4 points)**

What is the index of $SL_3(\mathbb{Z}_3)$ in $GL_3(\mathbb{Z}_3)$? ____

Hint: There are many ways to do this, but one is to use the first isomorphism theorem to understand the quotient group $GL_3(\mathbb{Z}_3)/SL_3(\mathbb{Z}_3)$.

Answer(s) submitted:

- 2

submitted: (correct)
recorded: (correct)

Problem 5. **(4 points)**

Let $G = U_{48}$ and let N be the subgroup generated by $[7]$. Compute the order of $N[-13]$ in G/N. (Note, here "order" means the order of the element in the group, in the sense of page 198 in the textbook, not the cardinality of coset.) ____

Answer(s) submitted:

- 4

submitted: (correct)
recorded: (correct)