Math 171
Shahriari

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Ordered Number: **14**

HW #: **9w**

Day: **Mon.** **Wed.** **Fri.**

Date: **3/21/18**

No.	**Points**	**Acknowledgments**
10.2.17		Cole K., Owen G.
10.3.9		
10.3.11		
11.1.2		kfldsafjksd
11.1.10		
Total		

This Homework is (check one):

- [x] On Time
- [ ] 2 day extension #1
- [ ] 2 day extension # 2
- [ ] 2 day extension #3
- [ ] 2 day extension #4
- [ ] Brownie Point Extension
- [ ] Late

Problem 10.2.17 (The alternating group of degree 5)

Use problems **6.2.15** and ***10.2.15*** and Lagrange's theorem to prove that A_5, the alternating group of degree 5, has no non-trivial normal subgroups.

Solution:

Problem 10.3.9

Let G be a group, and let $N \lhd G$. Assume that $|G : N| = m$. Let $x \in G$. Prove that $x^m \in N$.

Solution:

Problem *10.3.11*

Assume that N is a normal subgroup of a group G. Assume E is a subgroup of G/N. Thus E is a collection of right cosets of N in G. Let K be the union of all the elements of E. In other words, K is a subset of G consisting of all the elements in the right cosets in E. Prove that K is a subgroup of G that contains N. What is $|K|$?

Solution:

Problem 11.1.2

Define $\phi : (\mathbb{Z}/8\mathbb{Z}, +) \to (\mathbb{Z}/8\mathbb{Z}, +)$ by $\phi(x) = 2x$. Is ϕ a homomorphism? If so, what is $\phi^{-1}(\{0\})$? Answer the same questions for $\theta : (\mathbb{Z}/8\mathbb{Z}, +) \to (\mathbb{Z}/8\mathbb{Z}, +)$ defined by $\theta(x) = x^2$.

Solution:

Problem 11.1.10

Let $\phi : G \to H$ be an onto homomorphism.

(a) Assume that G is abelian. Does this imply that H is abelian? What about the converse?

(b) What if we replaced abelian by cyclic in the above question?

Solution: