

## Quiz #7

Monday, November 27 2017

**Duration: 20 min**

**NAME:** \_\_\_\_\_

**Please write clearly and properly. Justify your answers carefully.**

| <b>Problem</b> | <b>Grade</b> |
|----------------|--------------|
| <b>1</b>       |              |
| <b>2</b>       |              |
| <b>3</b>       |              |
| <b>Total</b>   |              |

**Problem 1** (~ 4 points).

Let  $\varphi: G \rightarrow G'$  be a group homomorphism. Show that  $\text{Ker } \varphi$  is a normal subgroup of  $G$ .

**Problem 2** (~ 4 points).

Let  $n$  be a positive integer. Show that the group  $\mathbb{Z}/n\mathbb{Z}$  (additive group of integers modulo  $n$ ) is isomorphic to the group  $U_n$  (multiplicative group of  $n$ -th roots of unity in  $\mathbb{C}$ ).

**Problem 3** (~ 4 points).

Consider the quotient group  $G = \mathbb{Z}/6\mathbb{Z}$  and the elements  $x = [3]$  and  $y = [4]$ .

(1) Compute  $x + y$ .



(2) Compute  $-x$  and  $-y$ .



(3) Find the order of  $x$  and  $y$ .

