RUTGERS
UNIVERSITY | NEWARK

Math 451
Abstract Algebra I

Fall 2017

Quiz #2 Make-up

Monday, October 2 2017

Return on: Monday, October 9 2017

NAME: _____

Please write clearly and properly. Justify your answers carefully.

Problem	Grade
1	
2	
Total	

Notation. Recall that for any integer $n \geqslant 2$, U_n denotes the set of n-th roots of unity in $\mathbb{C}$:

$$U_n = \{z \in \mathbb{C} \mid z^n = 1\} \ .$$

Problem 1 ($\sim$ 6 points)**.** List the elements of U_6, both in algebraic and polar form. Draw the set U_6 in the plane. Check that $U_3 \subset U_6$.

Problem 2 ($\sim$ 3 points)**.** Let $\omega \in U_n$. Consider the map

$$\begin{aligned} f : U_n &\to U_n \\ z &\mapsto \omega z \ . \end{aligned}$$

Show that f is well-defined, then show that f is bijective.

Problem 3 ($\sim$ 3 points)**.** Let n be a positive integer. Solve the equation

$$1 + x + x^2 + \cdots + x^n = 0 \tag{0.1}$$

for $x \in \mathbb{C}$.

Hint: First compute $(1 - x)(1 + x + \cdots + x^n)$.