

Name:
CSU-ID:

Homework 1
due September 7, 2012

1. For $n = 5, 8, 12, 20$, and 25 , find all positive integers less than n and relatively prime to n .
2. Determine $\gcd(2^4 \cdot 3^2 \cdot 5 \cdot 7^2, 2 \cdot 3^3 \cdot 7 \cdot 11)$ and $\text{lcm}(2^3 \cdot 3^2 \cdot 5, 2 \cdot 3^3 \cdot 7 \cdot 11)$.
3. Find integers s and t such that $1 = 7 \cdot s + 11 \cdot t$. Show that s and t are not unique.
4. Express $(-7 - 3i)^{-1}$ in standard form.
5. Express $\frac{-5 + 2i}{4 - 5i}$ in standard form.
6. Which of the following sets are closed under the given operation?
 - a. $\{0, 4, 8, 12\}$ addition mod 16
 - b. $\{0, 4, 8, 12\}$ addition mod 15
 - c. $\{1, 4, 7, 13\}$ multiplication mod 15
 - d. $\{1, 4, 5, 7\}$ multiplication mod 9
7. In each case, find the inverse of the element under the given operation.
 - a. 13 in Z_{20}
 - b. 13 in $U(14)$
 - c. $n - 1$ in $U(n)$, $n > 2$
 - d. $3 - 2i$ in \mathbb{C}^* , the group of nonzero complex numbers under multiplication.
8. Suppose the table below is a group table. Fill in the blank entries.

	e	a	b	c	d
e	e				
a		b			e
b		c	d	e	
c		d		a	b
d					