EXAM

Exam 1

Math 3360–001, Spring 2015

Feb. 16, 2013

• Write all of your answers on separate sheets of paper. You can keep the exam questions when you leave. You may leave when finished.

• You must show enough work to justify your answers. Unless otherwise instructed, give exact answers, not approximations (e.g., $\sqrt{2}$, not 1.414).

• This exam has 3 problems. There are 200 points total.

Good luck!
**Problem 1.** In each part, give the definition of the term or concept, or state the theorem.

A. An **equivalence relation** on a set $X$.

B. The **division algorithm** in $\mathbb{Z}$.

C. An **ideal** in $\mathbb{Z}$.

D. **Fundamental Theorem of Arithmetic**

E. A **group**.

F. A **subgroup** of a group $G$.

G. A **cyclic** group.

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**Problem 2.** For each of the groups $U(8)$ and $U(10)$, determine the inverse of each element. Are these groups cyclic?

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**Problem 3.** For both of the groups $\mathbb{Z}_6$ and $\mathbb{Z}_8$, find the order of each element of the group and find all of the subgroups of the group (don’t forget the trivial ones).