Math 417 – Test 1 – Topics for Review – 2/18/19

1. Exam is 2/22/19 in class. Closed book/notes except for 3"×5" card. No calculators. Sections in Fraleigh are §§1–4, 5, 6, 8 and the material for HW 1–4, except order of permutations.

2. Vocabulary: commutative, associative, integers, divisibility, congruence mod n, primes, prime factorization, Definition of group (closed, identity, inverse), subgroup, cyclic group, isomorphism, permutation, subgroup generated by a set

3. Notation: $\mathbb{Z}$, $\mathbb{Q}$, $m \mid n$, $a \equiv b \bmod n$, $v_p(n)$, $\gcd(m,n)$, $(\mathbb{Z}/n\mathbb{Z}, +)$, $((\mathbb{Z}/n\mathbb{Z})^*, \times)$, $\langle a \rangle$ for $a \in G$, $\cong$ for isomorphism, $|G| = \text{order of } G = \#\text{elements in } G$

Multiplication table for $*_G$:

$*_G$	$\cdots$	y	$\cdots$
x	$\cdots$	$x *_G y$	$\cdots$

4. Groups to know: $(\mathbb{Z}/n\mathbb{Z}, +)$ – isomorphic to the cyclic group of order n – C_n; $((\mathbb{Z}/n\mathbb{Z})^*, \times)$ – structure in general more complicated; V = Klein 4 group, S_3 = symmetric group on $\{1,2,3\}$

5. Theorems to know: Euclidean algorithm, determining when $H \subseteq G$ is actually a subgroup, subgroups of cyclic groups and the connection with gcd. How to multiply permutations

6. Not on this test: $\phi(n)$, repeating decimals as such, LaGrange's Theorem, Cayley's Theorem, Calculating the order of a general permutation