FINAL EXAM STUDY GUIDE - MATH 100A - FALL 2017

Remark: The list of topics below is not exhaustive. It is likely that there will be things on the exam which do not appear in this study guide.

Know everything from the Midterm Study Guide

Know the definition of ...
(1) ... the *cycle type* of a permutation $\sigma \in S_n$.
(2) ... a *transposition* $\tau \in S_n$.
(3) ... an *even/odd permutation* $\sigma \in S_n$.
(4) ... the *sign homomorphism* $\mathrm{sign} \colon S_n \to \{\pm 1\}$.
(5) ... the *alternating group*, A_n.
(6) ... a *factor group* (or *quotient group*), G/N.
(7) ... the *Klein 4 group*, K_4.
(8) ... the *Quaternion group*, Q_8.
(9) ... a *group action*, of a group G on a set S.
(10) ... the *orbit* of an element $x \in S$, $\mathrm{Orb}(x)$.
(11) ... the *stabilizer* of an element $x \in S$, $\mathrm{Stab}(x)$.
(12) ... a *transitive* group action.
(13) ... the *action of a group G on cosets G/H*.
(14) ... the *conjugation action*.
(15) ... a *simple group*
(16) ... a *conjugacy class*, $\mathrm{cl}(x)$.
(17) ... the *fixed set* of an element $g \in G$, S^g.

Know the statement of the following:
(1) Transpositions generate S_n.
(2) Every permutation $\sigma \in S_n$ is a product of disjoint cycles.
(3) Two permutations are conjugate $\iff$ the have the same cycle type.
(4) The first isomorphism theorem.
(5) A group action of G on S is equivalent to a homomorphism

$$\phi \colon G \to A(S).$$

(6) The orbit-stabilizer theorem.
(7) The centralizer of $x \in G$ is the stabilizer of x for the conjugation action.
(8) The conjugacy class of $x \in G$ is the orbit of x under the conjugation action.
(9) The action of G on G/H is transitive.
(10) The class equation.
(11) Every p-group has nontrivial center.
(12) A_5 is a simple group.
(13) Cauchy's theorem.
(14) Burnside's lemma.

Go through the homework problems, especially the easy to medium level problems.