Math 215: Introduction to Advanced Mathematics
Final–Study Guide

• The final exam will be Friday December 13 10:30-12:30 308 Taft Hall. The exam will be cumulative covering all material in the course, but will emphasize material chapters 14-18.

• The course web page contains a week-by-week syllabus that gives a more detailed description of the material you are responsible for.
    `http://www.math.uic.edu/~marker/math215-F13/wtow.html`

• One good way to study is to work on the sample problems suggested on the course web page.

• During finals week I will have office hours: Mon 10-12, Tue 1:30-3:30, Fri 9:00-10:00

Sample Questions

These questions concentrate on Chapters 14–18 . Look at the earlier sample exams and midterms to review the earlier chapters.

1) Sketch the proof that there are infinitely many prime numbers.

2) State the Pigeonhole Principle.

3) Find gcd(273,221). Find $x, y \in \mathbb{Z}$ such that gcd(273,221)$= 273x + 221y$.

4) Sketch the proof that $\mathbb{R}$, the set of real numbers, is uncountable.

5) Decide if each of the following statement is TRUE or FALSE. If FALSE, give an example showing it is FALSE.

   a) If A is countable, then A is infinite.

   b) If $|X| = |Y|$ and $f : X \to Y$ is injective, then f is a bijection.

   c) The relation $x \sim y$ if and only if $x + y$ is odd for $x, y \in \mathbb{Z}$ is an equivalence relation.

   d) If $f : X \to Y$, then $\{\overleftarrow{f}(y) : y \in Y\}$ is a partition of X.

   e) There are $x, y \in \mathbb{Z}$ such that $35x + 28y = 15$

6) The dyadic rationals is the set $D = \{\frac{a}{2^n} : a \in \mathbb{Z}, n \in \mathbb{N}\}$. Prove that D is countable.