

Math 215: Introduction to Advanced Mathematics
Final–Study Guide

- The final exam will be Friday December 14 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/wtow.html>
- One good way to study is to work on the sample problems suggested on the course web page.
- I will have VERY limited office hours during exam week:
Fri Dec 14 8:30–10:00
The TA Landon Kaville will have office hours
Monday 10-12
Tuesday 10-12
Thursday 8-9, 1-2

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 $f : X \rightarrow Y$ is injective, then f is a bijection.
 - b) 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 $f : X \rightarrow Y$, 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.