MATH 430 – Number Theory – SPRING 2017

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Office Hours

Monday, Wednesday & Friday   11::00 to Noon
Tuesday & Thursday   Noon to 1:00
And by appointment.

Required Packet *Math 430 Number Theory Spring 2017 Notes and Exercises*
Cost: $13.40

Canvas You can find this syllabus and HW assignments on Canvas.

Recommended Text *Elementary Number Theory* by Underwood Dudely. You can purchase this paperback from Amazon for about $15 including shipping & handling.

Grading System

Homework   30%
Homework will be assigned and collected on a regular basis.
Your homework will be read and commented on.
You will be allowed to redo three homework problems. In this case you have one week after the assignment is returned. Hand in the original HW with your redo.
Extra credit is encouraged! See next page.
N.B., If you use a theorem that has a name, then say so!
E.g., "By Euclid's Lemma we have . . . "

Midterm Exam   30%
There will be one in-class midterm exam for your pleasure and enjoyment. ☺
Tentative Date: Friday, May 5th

Final Exam   40%
The Final Exam will be a take-home.
Handed out: Wednesday, May 31st
Due: Monday, June 5th by Noon.
N.B., There is a research paper option in lieu of the final exam. See next page.

Grading Scale

A: 93%   B: 83%   C: 73%   D: 63%
Note: A minus grade is "-3%" and a plus grade is "+3%".
E.g., 77% is a B- and 83% is a B+.

Important Dates

Memorial Day Holiday   Monday, May 29th

Course Objectives

This course introduces students to selected topics in Number Theory that will reinforce the proof writing skills learned in MATH 260 (Logic & Sets). There is also a fair amount of computation involved that will reinforce the concepts and provide insight and intuition. Fundamentally, Number Theory is the study of divisibility, factorization and primes in the positive integers. This study will lead us to investigate all the integers (positive, negative & zero) and the rational numbers as well. Learner objectives, outcomes and skills include, but are not limited to:

- using the Euclidean Algorithm to find the gcd of a pair of positive integers and solve linear congruence equations
- understanding and using the Fundamental Theorem of Arithmetic to compute and solve a variety of problems
- applying the Chinese Remainder Theorem
- using Fermat's *Little* Theorem (FLT) and Euler's Generalization of FLT
- computing Pythagorean Triples and solving related problems
- solving linear congruence equations
- knowing some of the history, significance and role Fermat's **Last** Theorem has played in mathematics, especially, number theory.

Comments

1. **Exam**. The exam for this course can be broken up into the following five components:
(i) Definitions & Named Theorems:
    Logically equivalent statements for definitions and *any theorem that has a name*.
(ii) Basic proofs:
    You should know any proof I give in class that is starred: **proof***.
(iii) True – False
    You know what true – false questions are like.
(iv) Computations:
    Routine computations similar to HW problems.
(v) Original proofs:
    Routine proofs similar to HW problems.
2. **Extra Credit**. Extra Credit in your packet is marked with an asterisk (e.g., 4*). These problems are not restricted to your packet – find an interesting and non-routine problem in Dudley's book, and then ask me if it is appropriate. Even better, if you have found your own pattern and you think you can prove it, submit it.
In general, consult with me on any problem you find interesting.
There is an extra special extra credit worth 50 to 70 HW points. Ask me for details.
Deadline for extra credit is 10 days after that topic has been covered.
N.B., All Extra Credit must be *individual* work – no joint work or other collaborations.
3. **Expository Paper**. An expository paper/project, minimum six pages and three works cited, can be submitted in lieu of the Final Exam. Deadline for topic approval is Friday, May 12. Team projects (two students) are welcome. Students must have a B or better to pursue this option. Details and paper/project suggestions will be given upon request.
4. **Homework Protocol** Ideally, homework should be done individually. However, your MATH 430 professor understands the value of collaborative work or receiving help from someone other than yours truly. All I ask of you is that you document those from whom you received assistance. In these cases please write at the beginning of your homework paper:
(i) "I received help (assistance, hints) on problem(s) _____ from _____."
or
(ii) " 'Ethan' and I worked together on problem(s) _____."