

METU, Fall 2011, Math 523.

Term Project

You will choose a topic from the list below and write a 5-10 page article (in \LaTeX) giving an overview of the topic. You should mention about the

- history,
- significance (or applications),
- and generalizations (or possible future work).

If you are not sure what to choose, I can assign you one topic. If you want to work on a different topic that is not on the list, that could be possible as well.

We should settle on your topic by October 19. It will be great if everybody chooses a different topic. The first draft is due November 23. This first draft should show your familiarity with the topic and does not have to be perfect. After I read these drafts, I will meet each one of you to make suggestions.

In writing your paper think of the reader as your future self. When you come back after a year, you should find it easy, pleasant and informative reading.

Topics for the project

1. Kummer's criterion.
2. Class number one problem for imaginary quadratic fields.
3. Cyclotomic fields of class number one.
4. Cohen-Lenstra heuristics.
5. Class number and unit group of real quadratic fields.
6. Theta functions and sums of four squares.
7. The Shimura reciprocity law.
8. The Stark conjectures.
9. Pell's equation.
10. Adèles and Idèles.
11. Cyclotomic units and Stickelberger ideal.
12. The Kronecker-Weber theorem.
13. Iwasawa theory.
14. Chebotarev's density theorem.
15. Cyclotomic function fields.
16. Class field theory.