Math 582   Teaching Core College Mathematics   Winter 2013

Instructor   Amites Sarkar

Text   How to Solve It
                           George Pólya

Course content

This course has two purposes: to help you pass the graduate qualifying exam in March, and to prepare you to teach courses in calculus and linear algebra. These are very different goals, but for both of them you will require:

- A thorough understanding of the material

- Problem solving strategies

- The ability to present a mathematical argument clearly and precisely

You will have two assignments each week. First, I will assign three questions from past qualifying exams for you to solve, and possibly present in class. Second, you will have to read either an essay (see below), or part of Pólya's book. Class time will be split between lectures (given by me), presentations (given by you), and discussions on the essays and on the book.

The phrase "problem solving strategies" requires some clarification. Perhaps you've had the following experience. Faced with a mathematical problem, you're familiar with the general theory, but, nonetheless, you don't know where to begin. This happens to even the best mathematicians. Fortunately, there's often *something* you can do to help you get unstuck. This is the subject of *How to Solve It*.

Anyone teaching mathematics should know what mathematics *as a whole* is all about, and why it's taught at all, and that's one of the reasons I'm making you read the essays below. Some of them just exemplify excellent mathematics, while others discuss mathematics more generally. Most can be found on the Internet using Google; I'll place the more obscure ones on a Dropbox site. I hope you enjoy reading them.

Essays

U. Dudley, What is mathematics for?, *Notices Amer. Math. Soc.* **57** (2010), 608–613.

W.T. Gowers, The importance of mathematics, available at
`https://www.dpmms.cam.ac.uk/∼wtg10/papers.html`.

B.L. van der Waerden, How the proof of Baudet's conjecture was found, in *Studies in Pure Mathematics* (edited by L. Mirsky), Academic Press, 1971.

J.M. Hammersley, On the enfeeblement of mathematical skills by 'Modern Mathematics' and by similar soft intellectual trash in schools and universities, *Bull. Inst. Math. Applic.* **4** (1968), 66–85.

D. Gale and L.S. Shapley, College admissions and the stability of marriage, *Amer. Math. Monthly* **69** (1962), 9–15.

J.E. Littlewood, Lion and man, in *Littlewood's Miscellany* (edited by B. Bollobás), Cambridge University Press, 1986.

G.H. Hardy, The case against the mathematical tripos, *Math. Gazette* **32** (1948), 134–145.

J. Hadamard, Newton and the infinitesimal calculus, in *Newton Tercentenary Celebrations*, Cambridge University Press, 1947.

Office hours

My office hours are 10–10:50 on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays, in 216 Bond Hall. My phone number is 650 7569 and my e-mail is amites.sarkar@wwu.edu