# Math 74 – Advice for the Oral Presentation.

Adam Booth.

Fall 2007.

Nothing in this document is an official requirement for the oral presentation unless it also appears in the syllabus. It's just advice to help you do a good job.

The first thing to do is to choose a topic to present. The easiest thing to do is to find a book you find interesting and make a presentation based on that, but you're free to be more inventive if you like. Here are some book suggestions:

1. Hofstadter, D. R. *Gödel, Escher, Bach.* This isn't a math book, but it has plenty of math in it: Russell's paradox, Gödel's incompleteness results, some theory of computability. Remember that your presentation should include explicit theorems and proofs (you don't have to prove every theorem you state, but you should prove at least one).

2. Acheson, D. *From Calculus to Chaos.* This is a good introduction to some areas of applied math that should be accessable to anyone who's had a year of college calculus. Many of his chapters could be cut down into talks. He has sections on numerical methods, planetary motion, fluids and (of course) chaos theory.

3. Adams, C. *The Knot Book.* This is a very nice introduction to knot theory, without assuming abstract algebra.

4. Sipser, M. *Introduction to the Theory of Computation.* A very readable book for people who are new to reading math, there are some nice topics here related to the what it means to be 'computable'.

Here are some other ideas for talks that I can't think of specific books for, but I could help you look if you can't find anything.

1. Non-Euclidean Geometry. Introducing the main idea and proving some stuff about geometry on a sphere would make a good talk (in fact, I've seen it done). There's probably lots more scope here.

2. History of math. There are lots of good topics here, just be sure to prove something. One good topic might be the search for solutions to polynomial equations.

3. Group theory. What is a group? This is probably how an abstract algebra class would begin, but there's no reason why you couldn't give a quick introduction.

4. Frege's Project. What was it? Why did it fail (Russell's paradox).

5. Complexity theory. What are the basic definitions? Prove a basic result to illustrate them. State one of the most important open problems in current math: $P$ vs. $NP$. (The Sipser book might be good for this, among other things).

There's no one structure that works for every math talk, but there is some general guidance I can give. Firstly: say everything three times. That is, tell us what you're going to tell us, tell us it, and then tell us that told it to us. Secondly: give motivation. Why should we care about these results? How do they fit into a wider area?

Think about whether you'd like any extra resources. Handouts can make it easier on your audience to look back at a definition or result they've forgotten and you've erased, or can allow you to present graphs or tables that would be tiresome to draw on the board. Don't, however, assume that people can absorb material at the speed they can read it; the speed you can write it on the board is a better guide for pace.

As for timing, you should definitely rehearse your talk so as you know how long it takes. One guideline for planning is this: look at how many pages of notes one of my 50 minute lectures generates; your notes for your presentation should take up about half as many. You should allow time for people to ask you questions (if no-one else asks, I will).

You also have to write some problems for us to work on in groups. Writing problems is hard and I don't expect these to be top notch straight away, but I can try to give some general advice. There are pretty much two types of questions you need: simple ones that get us to apply your defintions and results to simple 'calculations'[1]; and ones that build on your talk and get us to solve problems which require some thought. Timing these will likely be very difficult, so err on the side of writing too many.

Finally, I suggest (though it's not technically required) that you meet with me about a week before your talk (email me to set up a time) with some reasonably concrete ideas already in place to discuss. If you're having trouble coming up with reasonably conrete ideas, we can meet earlier to help work some out.

Good luck!

[1]Example: if you defined the intersection of two sets, you might have us calculate a few intersections.