

Welcome to MathOverflow!

David E Speyer

Back in 2009, I was one of several bloggers running a mathematics blog called the *Secret Blogging Seminar*. We often had open threads where our readers would pose questions for each other, about whatever mathematical topic they were considering. In early October 2009, several of our readers mentioned that they had obtained answers to their questions on a website called “MathOverflow.” I googled “Math Overflow” and discovered a website with a long list of questions in every field of mathematics. I was immediately sucked in and began asking and answering questions, and have enjoyed the website ever since.

At the time, going to MathOverflow felt like walking down the hall to tea, where I might find my friends discussing an interesting question of algebraic geometry or topology—except that it was a tea that never ended, featuring mathematicians from around the world! Today, MathOverflow feels more formal. MathOverflow gets about 300 questions and 250 answers every week [4], and many of the world’s top mathematicians ask and answer questions regularly. I find many graduate students are intimidated by MathOverflow, and are unsure whether they are welcome there. I think they should feel welcome, and I hope this article will help to invite them in.

There are two ways to address this concern. The first is to give a detailed list of best practices, which I hope will give you the best chance to enjoy and benefit from the website. The second is to say “Come on over and have fun! We’re friendly!” I think each type of advice is right for some people, so I’ll give advice of both types, and I hope that you will be able to pick the right balance for yourself.

While I have been on MathOverflow since near its start, I have never had an official position operating or moderating the site; I speak only for myself.

You can find information about the nuts and bolts of MathOverflow at [1] and about the governance structure of MathOverflow at [2] and [3]. I will concentrate on the social aspects of how to interact with MathOverflow in this article.

How Does MathOverflow Work?

If you head to <https://mathoverflow.net>, the main thing you will see is a column of questions down the center of the screen. Each question shows a title, a list of “tags” for relevant mathematical areas, and the numbers of users who have viewed the question, who have upvoted it, and who have answered it. You’ll also see lots of other things

David E Speyer is a professor of mathematics at the University of Michigan. His email address is speyer@umich.edu.

DOI: <https://dx.doi.org/10.1090/noti2347>

on the left and right sidebars; I’ll let you click on them and learn what they do.

The essential operation of MathOverflow is the following. A mathematician becomes interested in a question about a point of mathematics. After some thought and research, they are unable to resolve it. They post the question to MathOverflow. Other mathematicians read the question and, with luck, answer it. Many mathematicians read the questions and answers and benefit. Registered users vote on questions and answers, and high vote counts can be used to find questions which many people find of interest, and answers which many people believe to be correct.

The next few sections of this article address these actions in the reverse order: How can you benefit by reading MathOverflow questions and answers? How and when should you answer questions? How and when should you ask questions, and what thinking and research should you do before asking?

You do not need to join MathOverflow to use it! If you spend much time on MathOverflow, you should consider becoming a member, which will allow you to vote and comment on questions and answers and to participate in improving the operation of the site. But anyone on the internet is completely welcome to read and write questions and answers in complete anonymity.

One note: the place to ask questions about how to use MathOverflow is <https://meta.mathoverflow.net/>, known as meta, not on MathOverflow itself.

Browsing

I want to start by discussing how you can benefit from reading MathOverflow, even if you do not want to ever show yourself. I am not trying to encourage you to stay hidden—quite the reverse—but spending a while reading MathOverflow will do a lot to get you used to the operation of the site. Also, we shouldn’t forget how much of the benefit of MathOverflow accrues to the nonposters: a typical question has one asker, one or two answerers, and 200–300 readers [5].

Heading to the main page of MathOverflow will show you the currently active questions, from all areas of mathematics. If you want to look for a specific question and see if it has been asked before, you can search MathOverflow either using the built-in search tool, or using any search engine; I usually get the best results with a Google search for “mathematical topic site:mathoverflow.net.”

If you more generally want to read about an area of mathematics, you can filter MathOverflow by tags; head to <https://mathoverflow.net/tags> for a list. I came out of graduate school with no idea of what one would actually study in differential geometry or functional analysis; browsing questions with those tags helped me learn what such mathematicians do.

You can also learn a lot by reading the questions or answers of a user whose style appeals to you. If you click on

the name of any user, you can see a list of all their questions and answers, sortable in various ways. When I see a user asking an unusually interesting question or giving a strikingly clear answer, I click over to see what else they have done. If their strengths are in areas different from mine, I'll read their work and try to learn how they think.

Answering

So, you see a question and you know the answer! Great! You should answer it!¹

You don't need to put the level of care into writing a MathOverflow answer that you would put into writing a research paper; that is one of the reasons MathOverflow is more fun! In particular, partial answers are completely acceptable, and it is fine to write things you know without doing a literature search to see who knew them first.

With that said, it is worth editing your answer to see if you have written your ideas clearly and put them into the best order you can. Take time to fill in details, and to add useful links and images. As in all mathematical writing, please remember to use words, not just a sequence of equations! I would normally spend 5–10 minutes on a quick answer.

You have two audiences: the original asker of the question, and those mathematicians who will read the answer in future years. I think you should try to write an answer which will help both of them. If you know the question asker is an expert in the area of the question, it is still worthwhile to include basic background material—and experts often don't remember as much of the basics as you might expect!

MathOverflow supports a subset of LaTeX known as MathJax. If you write equations as you normally would, enclosed in dollars signs or double dollar signs, they will likely appear as you expect. If you want to define macros, you can put the definitions at the start of your answer (using `\newcommand` or `\def` as usual) inside dollar signs; these definitions will then apply within your answer. You can also include lists, HTML links, tables, and other basic formatting using a formatting language known as Markdown. MathOverflow provides a graphical toolbar at the top of your edit window to select these options or you can write Markdown code directly.

I want to add a psychological note. I think many graduate students think of themselves as passive, absorbing material from others. But by the time you have started working on research you have learned a great deal in your area, and you have also learned the foundations of mathematics much more recently than the rest of us have. You should expect that you will sometimes know facts or see

connections that other, older, mathematicians don't. And when you do, please share your insights with us!

Asking

We now come to the topic of when, whether, and how to ask a question on MathOverflow. This is a contentious question, and not all MathOverflow users agree; see [6], [7], and [8] for thoughtful past discussions of this topic.

I want to balance two messages in this section: you should take care to ask questions well, but you should not be so worried about this that you don't ask!

In my view, a question belongs on MathOverflow if it is something that a mathematician would not be able to easily track down the answer to themselves by either a little thought or a little googling. A further criterion is that a question should be capable of having a definite answer, and receiving that answer in a reasonable amount of space (say 1–2 screens). If you are doing mathematical research, I think you should assume that your questions belong on MathOverflow.

MathOverflow users often use the phrase “research level” when describing what sort of questions are welcome on MathOverflow. What does this mean? It definitely excludes standard questions from undergraduate and beginning graduate classes. It definitely includes minor lemmas, definitions, or questions that come up in working on research.

In my opinion, it should also include the “standard background” of a mathematical field, assuming that background is beyond the standard graduate course curriculum. I don't know the things that every group theorist knows, and I want to be allowed to ask! But I will warn you that some users seem to feel that you shouldn't ask questions about a field of math until you know the background that people in that field know. All I can say is that many MathOverflow users think that is silly, and will defend your questions.

Before asking a question on MathOverflow, you should put a serious effort into thinking about it yourself. You should also ask your advisor (if you are a graduate student), and do some basic internet searches. As you start typing your question into MathOverflow, the website will try to suggest related questions; click through that list to see if your question is already there. More than half the time when I start to ask a question, I find the answer before I finish asking. As far as I am concerned, this is a MathOverflow success story!

After that, you should ask the question! Explain the context of your question and attempt to make it self-contained, while still getting to the point in a paragraph or two.

I'll add some quotations from a conversation on meta entitled “Should graduate students be encouraged to participate in MO? If so, at what stage?” [6]. Experienced users suggest answers such as “As soon as the student is ready for a mathematical discussion, he or she is welcome to enter” and “I encourage my graduate students to ask questions on

¹This applies to almost all readers. If you are someone who is on MathOverflow near daily and answers questions frequently, I would say something more nuanced.

MO when they've asked me and I didn't know the answer quickly and it seemed like a good question for MO."

After Asking

Answers will most likely show up somewhere between ten minutes and two days after asking. If you are a registered user, MathOverflow will show you a notification on the "inbox" icon when answers have come in. You should upvote all answers which are helpful and, if you get a full answer, you should mark it as accepted with the "check mark icon."

I'll turn now to two negative issues which can occur after asking a question, but the first paragraph of this section is, most often, all you need to know. First, if your question is duplicative of one of the others in MathOverflow's eleven-year history, it will likely be marked as a duplicate and closed, with a link redirecting to the previous question. Many people find this frustrating but, quite often, the answers at the previous question really are good ones which address what you want to know. If they do not, you should feel free to comment and explain why.

Many people feel that MathOverflow users nitpick language too often and don't do a good job focusing on what the asker meant. What can I say to people who are concerned about this? Some time browsing, and some time reading research papers in your area, will help you to select your language. You should also consider whether corrections are valid. But, if you have made a reasonable effort to do these things, you shouldn't beat yourself up because some jerk thinks you haven't done enough.

Don't Worry About "Reputation"

MathOverflow assigns a numeric score called "reputation" to each user. You gain reputation when other users upvote your questions and answers, and when you have more reputation you will be able to use additional features of the site. My advice is to simply not think about reputation at all. If you find that you enjoy MathOverflow and start posting regularly, your reputation will naturally grow; if you only post on MathOverflow rarely, you won't get much reputation, and both outcomes are fine.

I'll also add my opinion that the reputation system unfairly rewards users who have been on the website a long time (like me!). For example, Matt Emerton hasn't participated on MathOverflow in years, but he continues to gain reputation on the many excellent things he has written, so his reputation is very high. If you look only at reputation, there are a lot of younger users that you are undervaluing.

Consider Using Your Own Name, But You Don't Have to

Most MathOverflow posts are written by people using their real names. I think it is usually to your benefit to use your real name. Almost all users on MathOverflow post things which reflect well on them, and having things online which

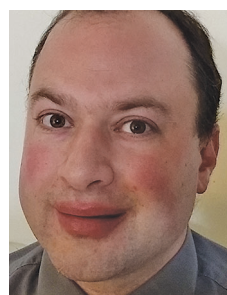
reflect well on you is to your advantage. That said, there is no requirement to publicly identify yourself in any way if you don't want to.

Enjoy!

Finally, have fun! Learning math is fun, and MathOverflow is a wonderful place to do it!

References

- [1] *MathOverflow help center*, MathOverflow, <https://mathoverflow.net/help>.
- [2] *Who are the moderators*, MathOverflow, <https://mathoverflow.net/users?tab=moderators>.
- [3] *Who owns MathOverflow*, MathOverflow Meta, <https://meta.mathoverflow.net/questions/969>, October 2013, last modified June 2019.
- [4] *Questions and Answers per week*, StackExchange data explorer, <https://data.stackexchange.com/mathoverflow/query/1118998>.
- [5] *Average view count*, StackExchange data explorer, <https://data.stackexchange.com/mathoverflow/query/1350984>.
- [6] *Should graduate students be encouraged to participate in MO? If so, at what stage?*, MathOverflow Meta, <https://meta.mathoverflow.net/questions/4704>, September 2020.
- [7] *Should this site be "a shortcut to substitute for literature searches"?*, MathOverflow Meta, <https://meta.mathoverflow.net/questions/1516>, February 2014, last modified April 2017.
- [8] *"Newbie-style" questions: is there an "official" viewpoint of MO?*, MathOverflow Meta, <https://meta.mathoverflow.net/questions/3255>, May 2017, last modified June 2017.



David E Speyer

Credits

Photo of David E Speyer is courtesy of the author.