

# Contributing to SageMath: a guide for mathematicians

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NOSH talk

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Motivations

Process

Useful resources

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# Why contributing?

- Community:
  - SageMath is used by a wide range of people
  - Be part of a new community
- Useful:
  - For research (e.g. <https://arxiv.org/abs/2401.12618>)
  - For learning
  - Make your work visible
- Develop valued skills:
  - Skills applicable to most *Free and Open Source Software* (FOSS) projects
  - Diversify your skillset
  - Contributions are visible
- Have your work recognized (e.g. *ISSAC Software Demonstrations*)

# Why SageMath?

- *Free and Open Source Software* (FOSS)
- Python-based
- Widely used
- A lot of computational facilities
- Very active development and community

# What to contribute?

Examples:

- Typos and small fixes
- Enhance documentation
- Add an algorithm
- Create a brand new module
- Solve existing issues

# Super duper honesty time

- **Get your supervisor's approval!**
- The process can be frustrating (like peer-review)
- Compiling SageMath = 🙄

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# Starter pack

You need:

- Git
- A Github account
- Python

# General principle

Integrate in the community!

# 1. Fork

The screenshot shows the GitHub interface for the `sagemath / sage` repository. The repository is public and has 514 forks and 1.6k stars. The `Code` button is highlighted in green. The `Actions` tab is also highlighted with a green circle. The `Code` dropdown menu is open, showing the `<> Code` option. The `About` section is visible on the right, showing the main repository of SageMath and a link to [www.sagemath.org](http://www.sagemath.org).

Repository: `sagemath / sage`

Actions: 413

Watch: 11

Fork: 514

Starred: 1.6k

Code: <> Code

About: Main repository of SageMath

[www.sagemath.org](http://www.sagemath.org)

Readme

View license

Code of conduct

Cite this repository

Activity

Custom properties

1.6k stars

File	Description	Last Commit
<code>.ci</code>	Replace bootstrap-conda by grayskull and ...	last month
<code>.devcontainer</code>	Switch devcontainer to use meson	last month
<code>.github</code>	Bump dev-hanz-ops/install-gh-cli-action ...	last week
<code>.upstream.d</code>	Updated SageMath version to 10.6.beta0	last month
<code>.vscode</code>	Merge branch 'develop' into meson-settings	3 weeks ago

## 2. Compile

Optional but highly recommended:

```
tmux new -s sage
```

Then:

```
git clone -c core.symlinks=true --filter blob:none \  
          --origin origin --branch develop --tags  \  
          https://github.com/your/fork sage  
cd sage  
make configure  
./configure  
make build -j1729 # Build (and parallelize on 1729 cores)
```

(Type `ctrl+b` then `d` to “detach” the tmux session, and run `tmux attach -t sage` to enter it again.)

### 3. Code

Some locations:

- Code: `src/sage/`
- Doc: `src/doc/`

After modifications, rebuild with:

```
./sage -b
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## 4. Connect with the community

- Open an *Issue* to discuss...
- If minor modifications, directly open a *Pull Request*...

The screenshot shows a GitHub issue page for the repository 'sagemath / sage'. The issue title is 'Implementation of finite Drinfeld modules #33713'. The issue is marked as 'Closed' and has a label '#35026'. The issue was opened by user 'kryzar' on April 15, 2022. The issue content includes a title 'What is a Drinfeld module?' and two paragraphs of text. The first paragraph defines a Drinfeld module over a finite field extension  $L$  of  $\mathbb{F}_q$  and a ring morphism  $\gamma: \mathbb{F}_q[X] \rightarrow L$ . The second paragraph defines a morphism of Drinfeld modules  $u: \phi \rightarrow \psi$  by an Ore polynomial  $u$  in  $L$  satisfying  $u \phi_X = \psi_X u$ . The right sidebar shows the 'Assignees' section with 'No one - Assign yourself', the 'Labels' section with 'c: number theory', 'p: minor / 4', and 't: enhancement', the 'Type' section with 'No type', and the 'Projects' section with 'No projects'.

sagemath / sage

Type / to search

<> Code Issues 51+ Pull requests 413 Discussions Actions Wiki Security Insights

Implementation of finite Drinfeld modules #33713

Edit New issue

Closed #35026

kryzar opened on Apr 15, 2022

Edit (2022-09-27). A lot has changed since the original post. Here is a quick update.

**What is a Drinfeld module?**

Let  $L$  be a finite field extension of  $\mathbb{F}_q$  and fix a ring morphism  $\gamma: \mathbb{F}_q[X] \rightarrow L$ . Let  $\tau$  be the ring of Ore polynomials with coefficients in  $L$  and whose generator is the Frobenius endomorphism  $\tau: x \mapsto x^q$ . A Drinfeld module over the morphism  $\gamma$  is uniquely defined by an  $\mathbb{F}_q$ -algebra morphism  $\gamma: \mathbb{F}_q[X] \rightarrow \tau$ ,  $P \mapsto \phi_P$ , verifying  $\phi_X = \gamma(X) + a_1\tau + \dots + a_r\tau^r$  and  $r > 0$ .

A morphism of Drinfeld modules  $u: \phi \rightarrow \psi$  is defined by an Ore polynomial  $u$  in  $\tau$  verifying  $u \phi_X = \psi_X u$ .

Assignees

No one - Assign yourself

Labels

c: number theory p: minor / 4 t: enhancement



Type

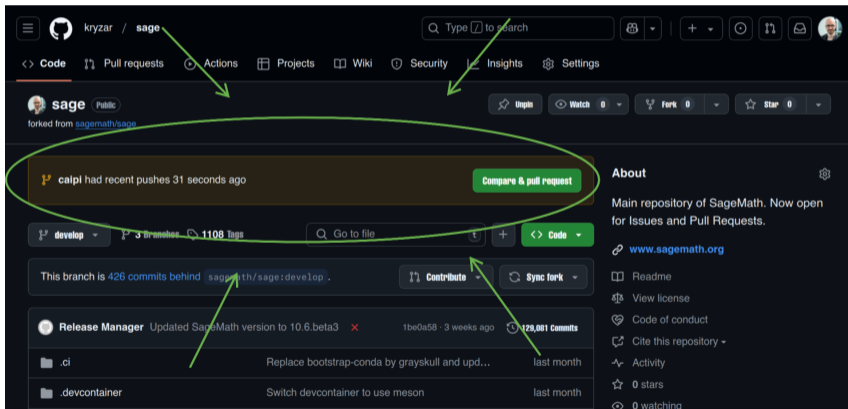
No type

Projects

No projects

## 5. Open your *Pull Request*

1.  You have written and pushed a bunch of commits on your fork!
2.  You have successfully written tests and documentation!



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# Basic checklist

Among other things:

- ☒ Does my code respect the standards of the community?
- ☒ Did I write a docstring?
- ☒ Did I write tests?
- ☒ Did I cover all cornercases?
- ☒ Did I correctly update the documentation?

# Useful links

## Tools:

Pro Git: <https://git-scm.com/book/en/v2>

Pep8: <https://pep8.org/>

## Community:

Mailing list <https://groups.google.com/g/Sage-Devel?pli=1>

Forum <https://ask.sagemath.org/questions/>

Sage Days <https://wiki.sagemath.org/Workshops>

## SageMath stuff:

Developer guide <https://doc.sagemath.org/html/en/developer/>

Documentation <https://doc.sagemath.org/html/en/index.html>

Main repo <https://github.com/sagemath/sage/>

Conventions [https://doc.sagemath.org/html/en/developer/coding\\_basics.html](https://doc.sagemath.org/html/en/developer/coding_basics.html)