Lab 1: Introduction to Sage

Important

Please read all of the instructions before getting started.

Goal

The goal of this lab is to introduce you to Sage, which is a free open-source mathematics software system licensed under the GPL whose goal is to provide a viable alternative to (the very expensive!) Mathematica, Maple, Magma, and Matlab.

What is Sage?

The following is taken from http://www.sagemath.org/tour.html:

> Sage is built out of nearly 100 open-source packages and features a unified interface. Sage can be used to study elementary and advanced, pure and applied mathematics. This includes a huge range of mathematics, including basic algebra, calculus, elementary to very advanced number theory, cryptography, numerical computation, commutative algebra, group theory, combinatorics, graph theory, exact linear algebra and much more. It combines various software packages and seamlessly integrates their functionality into a common experience. It is well-suited for education and research. The user interface is a notebook in a web browser or the command line. Using the notebook, Sage connects either locally to your own Sage installation or to a Sage server on the network. Inside the Sage notebook you can create embedded graphics, beautifully typeset mathematical expressions, add and delete input, and share your work across the network.

Why use Sage?

Sage is free!

- Downloading free

- Installing free

- Copying free

- Bug fixes free

- Future versions free

- Support is free

Sage is open-source!

- No hidden algorithms (if you are so inclined you can lift the hood and look inside)

- Can study implementation

- Can correct, improve, contribute to Sage

Directions

This lab should be completed in groups of 2-3.

First, each member of your group will need to sign in to PSU's Sage Notebook Server, which is located at:

<div align="center">http://sage.plymouth.edu</div>

I have provided each of you with a username and a temporary password. Your username matches your myPlymouth username. Once you log in, the first thing you should do is **change your password**. To do this:

1. click on "Settings", which is located along the top right side of the page (after logging in),

2. under the "New Password" section, enter the initial password that I gave you, enter a new password, and re-enter your new password to confirm,

3. click "Save" at the bottom (or top) of the page.

Once you do this, you should be returned to your "Home" directory, which is likely empty. At any time, you can always return to your "Home" directory by clicking "Home", which is located along the top right of any page.

The goal of this lab is to work through a worksheet that I made, which is called "Introduction to Sage (Calculus)." There are a few ways to access this file, but I'll just explain one way. Have **one member of your group** do the following. Open a new tab on your browser and then enter the following address:

<div align="center">https://sage.plymouth.edu/home/pub/2/</div>

Note: You need to type `https` (with an "s") instead of `http`.

The file you are looking at is a static copy of the worksheet that I published, but I want you to play with this worksheet and be able to edit it. To do this, click on "Edit this" in the upper left hand corner. (If you were not logged in, you would have to select "Log in to edit a copy".)

Before you actually do anything with this worksheet, I want you to share it with me and the other members of your group. Click "Save & Quit" in the upper right hand corner. This will return you to your "Home" directory. Now, click on "Share now" in the middle column for your newly created worksheet. Type in the Sage usernames of the members of your group (separated by commas). My Sage username is `dcernst`.

Note: If you typed in an incorrect username, unfortunately, you will *not* get a warning.

Your task is to read along while clicking "evaluate" (or typing "shift+enter") on each of the Sage cells. As you read, you should try to figure out what is going on. In some future labs you may be required to mimic what you see here, so really pay attention to what works and what doesn't. Feel free to edit the content of the cells and add new cells to experiment. Your lab is complete after you've read and clicked through the entire worksheet.