

MATH 211: DIFFERENTIAL EQUATIONS

LAB 1

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For our first lab we will be using Sage to explore qualitative, quantitative, and analytical solutions to differential equations. This lab is due by the start of class on Thursday, September 17. Here is what you need to do:

- (1) Using your web browser, preferably Firefox, navigate to the Bard Sage Server. You can reach this by following the “Sage Server” link at the bottom left my web page:

`http://math.bard.edu/greg/`

or by directly entering the Sage server URL:

`https://greg.bard.edu:8000/`

Please note that the Bard Sage Server is accessible from the Bard campus only. If you want to use the server from off-campus, email me.

- (2) Sign up for a new Sage Notebook account. You do not need to use your Bard username. Instead choose a username that clearly identifies you, such as “greg.landweber”, not “gl623”. When you submit your worksheets to me, I will identify you by your username.
- (3) Log into the Sage Notebook using your new account.
- (4) Create a new worksheet for using the New Worksheet link at the top left of the screen.
- (5) At the top left of the Untitled worksheet you just created, click the File menu and choose “Upload worksheet from a file”.
- (6) In the box labeled “Or enter the url of a worksheet file on the web:”, enter the URL for the lab on my web site:

`http://math.bard.edu/greg/lab1.sws`

and press the “Upload Worksheet” button.

- (7) Play with the worksheet, trying out the interactive demos of slope fields and Euler’s method, as well as the built-in Sage commands.
- (8) Use the Sage built-in command `plot_slope_field` to draw the slope fields for all of the differential equations from our Section 1.1 homework, and use the `desolve` command to find analytic solutions for all our Section 1.2 homework. Then pick at least two differential equations from the homework and try the `eulers_method` command.
- (9) To submit your worksheet, click the “Share” link at the top right of the notebook, and in the screen that comes up, share your notebook with “greg”.

Here are some Sage tips.

- To evaluate a cell, hit <shift>-<return> or <shift>-<enter>.
- To create a new cell, move the cursor just above an existing cell until a horizontal blue bar appears, and click.
- To get Sage's built-in documentation about a command, type the name of the command followed by a question mark "?" and evaluate the cell.
- For complete documentation and further information about Sage, visit
`http://www.sagemath.org/`
- You can also search for Sage commands and Sage code on Google.
- For examples of Sage code, you can browse my published worksheets on the Bard Sage Server.

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