Welcome to 4B Section

Section Information

- Attendance will be taken. Failure to regularly attend may factor negatively into your participation/quiz score.
- There will be regular quizzes in this section.
- Today there is only a worksheet. Turning in this worksheet will allow you to vote on office hours.

Outline

- Attendance, part i. Initial the sheet that is being passed around.
- Quizzes (none this week).
- Typically I will follow this by (briefly) discussing what Dr. Cotton-Clay has discussed in lecture. If all goes according to plan, this discussion will mostly be of possible pitfalls, and will take 5 minutes
- I will go over any questions you might have, about lecture, the text, or *homework that is already graded*. Do not expect to get answers to Webassign problems. If all goes according to plan, this will take at least 10 minutes. If it takes less than that, it is a sign that people are not making the necessary effort to understand the material (a bad sign, in other words).

Outline (cont)

- I will pass out a worksheet. I encourage you to ask me questions or discuss this with your neighbors. During this time, I will ask people if they are willing to present their work at the end of class.
- If all goes well, there will be enough time to present solutions.
- Attendance, part ii.

Math Lab

Location/Time

I will be in the Math Lab from 3-5pm every Monday. Math Lab is on the first floor of South Hall, in Room 1607.

Map

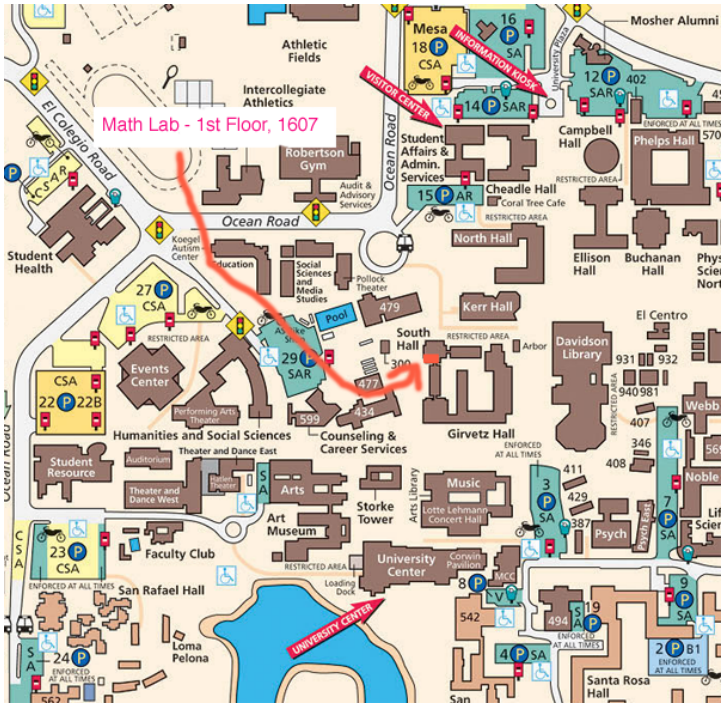


Figure: Math Lab Location

Office Hours

Location

Office Hours will occur in South Hall, Room 6432 K (Hours: TBD). Finding the exact room can be a bit daunting, but if you ask a graduate student they will almost certainly point you in the right direction.

Map

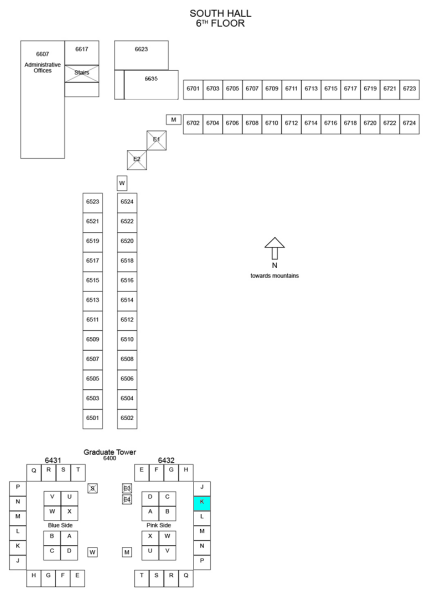


Figure: Office Hours Location

Slope/Direction Fields

Definition

A slope field is a diagram found by solving the differential equation for the first derivative at points in the yt-plane.

Fields

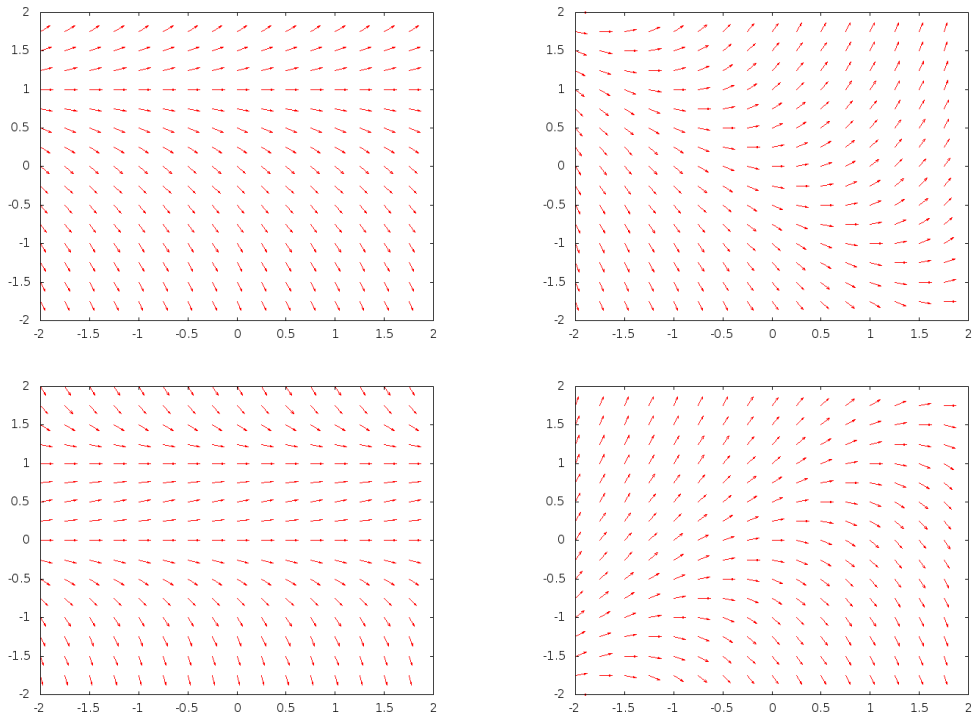


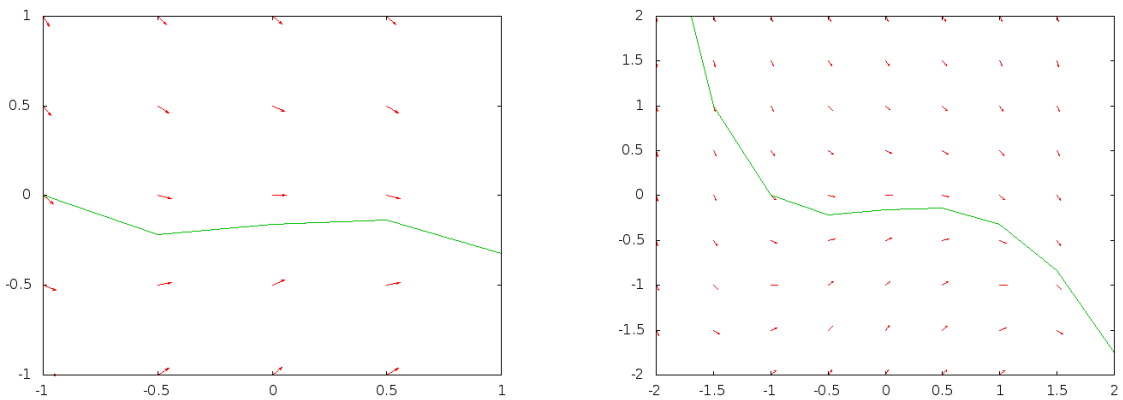
Figure: Examples of slope fields.

Common Pitfall

Long-Term Behavior

Consider the DE $y' = -y - t^2$. If we use the slope field to plot the integral curve at $y(-1) = 0$, we obtain the result shown in Figure 4 (a). If we go only by this sketch, it is plausible this DE demonstrates long-term oscillatory behavior, but it does not (see Figure 4 (b)).

Example



(a) (b)

Figure: Slope fields can be misleading.

Separable Equations

Definition

A differential equation is *separable* if we may write it as

$$M(x) + N(y)\frac{dy}{dx} = 0.$$

Method of Solution

We may solve such differential equations by "splitting the derivative" and integrating:

$$M(x)dx + N(y)dy = 0$$

$$\int M(x)dx + \int N(y)dy = 0.$$

We then solve the resulting equation, which is purely in terms of y and x (no y's) for y.

Common Pitfall

Maslow's Hammer

Not every DE is separable. When we are done with this topic, we will move onto other DE that are not soluble by this method. *In general, most DE have no known solution, and numerical methods are the only known attack. Do not expect any one tool to work universally.*

Example Nonseparable Equation

Try to separate $y' = xy - \sin x$.

Questions

Questions

Any questions on material presented here, in lecture, or in the book?

This presentation may be found at `http://math.ucsb.edu/~ldalton/`.