

Non-obvious controls:

- The UNDO button will erase the last change (up to 50 changes); there is no REDO button.
- The ZOOM on each graph is independent of the others. Students may need some guidance to interpret. The activity *Calculus Grapher for Math* would be helpful.
- If you are doing a lecture demonstration, set your screen resolution to 1024x768 so the simulation will fill the screen and be seen easily.
- There is a zoom feature for all Flash simulations. Right click on the sim and select **Zoom in**. This can be helpful when you are using a projector or writing a lesson where you want a screen shot.
- To “Reset All”, refresh your browser.

Important modeling notes / simplifications:

- As you draw a curve, sections are changed not the entire line.
- If you want to draw a sine curve that is uses the entire length, press ZERO first.

Insights into student use / thinking:

- For this learning goal: *Describe in words with illustrations what the derivative and integral functions are*. Students should be able to explain that the derivative is the “rate of change” and the integral is the accumulation of the area of the function
- Students should draw the graphs vertically aligned as they are in the simulation to help construct the correct relationships between the graphs.
- Some students had difficulty understanding that one graph can be zoomed, but the others do not change.

Suggestions for sim use:

- The simulations have been used successfully with homework, lectures, in-class activities, or lab activities. Use them for introduction to concepts, learning new concepts, reinforcement of concepts, as visual aids for interactive demonstrations, or with in-class clicker questions. To read more, see [Teaching Physics using PhET Simulations](#)
- Inquiry strategies take advantage of the simulation design. Invite the students to *play* with the simulation without any instruction. Use a *guided inquiry* approach to learning or ask *concept questions*. For help with creating effective guided inquiry activities or questions, see: [Guidelines for Contributions](#) or [Concept Questions](#)
- For activities and lesson plans written by the PhET team and other teachers, see: [Teacher Ideas & Activities](#)