

Mathematical Manipulatives: the MIT Mathlets

Electronic Mathematics Education Seminar
October 10, 2017

Haynes Miller, MIT
Jen French, MITx

Outline

1. First example: Linear phase portraits
2. Precursors
3. Second example: “AM radio receiver”
4. Design principles
5. Class discovery
6. Website
7. History
8. MITx (Jen French)

2. Precursors

IDE, Interactive Differential Equations, Addison-Wesley
Bev West, Steve Strogatz (Cornell)
Jean Marie McDill (Cal Poly San Luis Obispo)
John Cantwell (St Lewis Univ)

BU Differential Equations Project, Brookes/Cole
Paul Blanchard, Robert Devaney, Glen Hall

Both these projects, as well as the MIT Mathlets,
exploit the artistry and educational passion of

Hu Hohn, Mass College of Art and Design

3. Design Principles

Interactive (not animations)

Narrow focus (suites of related applets)

Pre-selected examples (no keyboard entry)

Multiple representations

Color coding

Mathematical correctness

No hidden parameters

Progressive display (radio buttons)

Uniformity of style and convention

Few cultural references

Accessibility (a11y)

5. Class discovery

Open the Mathlet

“Amplitude and Phase Second Order IV”

Play around with it. Pay attention to how the system responds as you vary the frequency and the system parameters.

Report on the Chat to Everyone what regularities you discover.

4 minutes.

5. Recommendations on use

- Practice: Know the cursor movements you want.
- Talk through the elements in sequence: they are not obvious to the student.
- Model each Mathlet for the students before expecting them to use it.
- Lecture demos are fun, but use by students in homework leads to much better learning!

7. History

2000 : d'Arbeloff grant : Hu Hohn; True Basic Unix executables

2002 : first use in an MIT ODE class : Arthur Mattuck

2002 - 2003 : formative assessment : Debbie Upton

2003 - 2012 : Java versions; Jean-Michel Claus

2007 - 2010 : engineering applications

Peter Dourmashkin (Physics)

Julie Greenberg (Health Sciences and Technology)

Karen Willcox, Chad Lieberman (Aero-Astro)

Franz Hover (Mechanical Engineering)

2010 - 2011 : OCW Scholar courses: Heidi Burgiel, Jerry Orloff, ...

2012 - 2016 : Javascript : JM Claus, Brandon DeRosier, Heather Petrow

2013 : Haitian Kreyòl versions : <https://haiti.mit.edu>

2014 : probability applets : Jerry Orloff

2014 : MITx: Calculus and then ODEs : Jen French

2015 : mobile device usage : Heather Petrow

2017 : a11y accessibility : Jean-Michel Claus, thanks to MITx



FIND COURSES ▾

About ▾

Give Now ▾

Featured Sites ▾

Search

Home » Courses » Mathematics » Single Variable Calculus

Single Variable Calculus

OCW Scholar

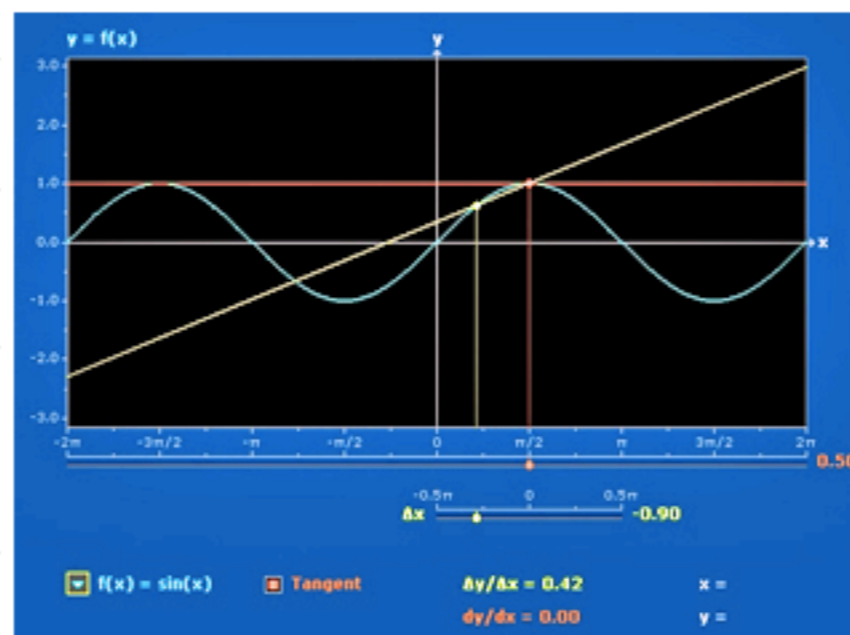
COURSE HOME <

SYLLABUS

1. DIFFERENTIATION

2. APPLICATIONS OF DIFFERENTIATION

3. THE DEFINITE INTEGRAL AND ITS APPLICATIONS



Instructor(s)

Prof. David Jerison

Level

Undergraduate

CITE THIS COURSE

Secant approximation mathlet from the d'Arbeloff Interactive Math Project. Image courtesy of Haynes Miller, Heidi Burgiel, and J.-M. Claus.

7. History

2000 : d'Arbeloff grant : Hu Hohn; True Basic Unix executables

2002 : first use in an MIT ODE class : Arthur Mattuck

2002 - 2003 : formative assessment : Debbie Upton

2003 - 2012 : Java versions; Jean-Michel Claus

2007 - 2010 : engineering applications

Peter Dourmashkin (Physics)

Julie Greenberg (Health Sciences and Technology)

Karen Willcox, Chad Lieberman (Aero-Astro)

Franz Hover (Mechanical Engineering)

2010 - 2011 : OCW Scholar courses: Heidi Burgiel, Jerry Orloff, ...

2012 - 2016 : Javascript : JM Claus, Brandon DeRosier, Heather Petrow

2013 : Haitian Kreyòl versions : <https://haiti.mit.edu>

2014 : probability applets : Jerry Orloff

2014 : MITx: Calculus and then ODEs : Jen French

2015 : mobile device usage : Heather Petrow

2017 : a11y accessibility : Jean-Michel Claus, thanks to MITx

