

Getting Started in *Mathematica*

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Mathematica is a powerful computer application for doing mathematics. It allows us to crunch numbers, make graphics, and even do calculus quite easily. Here we'll get started with the program and use it to do some exploring in dynamical systems

1 Where is *Mathematica*?

Mathematica is on just about every computer on the Harvard campus. More specifically, it's in the labs in the basement of the Science center on the Macintosh, IBM, and XWindows platforms.

If you have a computer in your home, Harvard's site license entitles you to a copy of the program free of charge. For more about this and other information about finding *Mathematica*, visit

`http://www.courses.fas.harvard.edu/software/mathematica`

on the World Wide Web.

2 Warmup Exercise

Many thanks to Greg Landweber for the use of his introduction. Download the document

`http://www.courses.fas.harvard.edu/~math21a/Mathematica/intro.nb`

and open it in *Mathematica*. This notebook has the basics of expression, cells, and functions.

3 Intermediate Exercise

Now use *Mathematica* to code the function $f(x) = 4x(1 - x)$. Produce plots of the graphs of f and $f^2 = f \circ f$ on $[0, 1]$. Do the same for the function

$$g(x) = \begin{cases} 4x & \text{if } 0 \leq x \leq \frac{1}{2}; \\ 2x - 1 & \text{if } \frac{1}{2} < x \leq 1. \end{cases}$$