



Wolfram
Mathematica[®]



Introduction to Mathematica

Workshop on Fundamental Engineering Skills

American Society for Engineering Education (ASEE)
Student Chapter at the University of Michigan

What we'll cover today...

- Basic commands and syntax
- Function definition
- Integration
- Differentiation
- Plotting

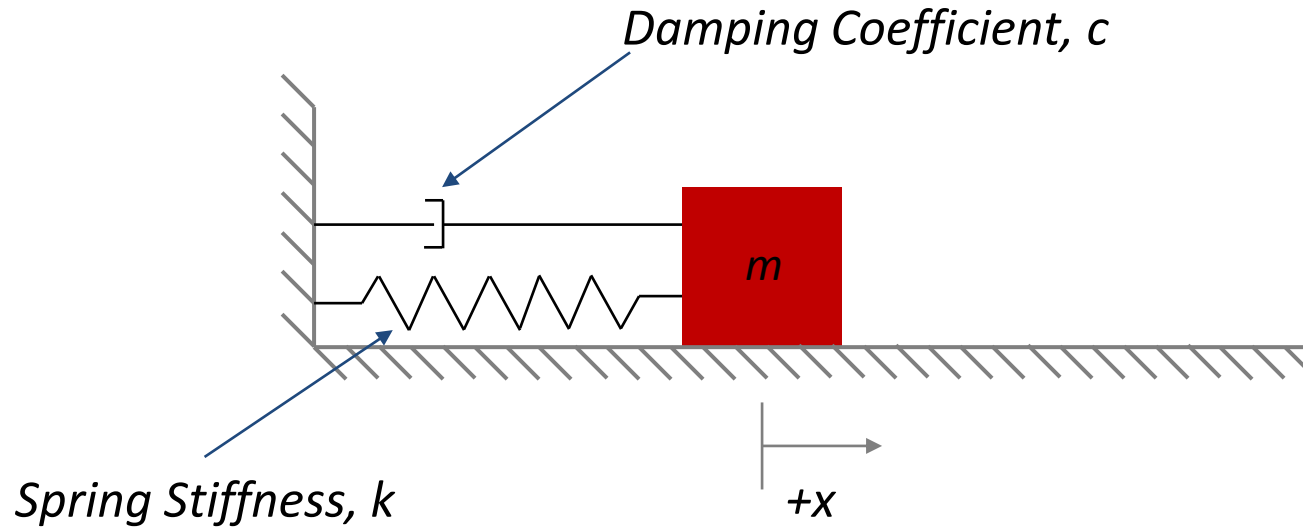
Why Use Mathematica?

- Symbolic manipulation
- Analytic and numerical calculations
- Excellent graphics for visualizing results
- Powerful built-in functions
- User-friendly *palettes*
- Helpful online documentation center

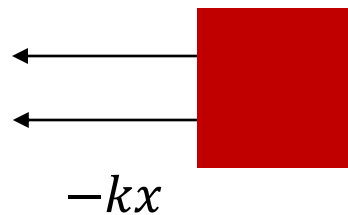
A Few Introductory Points

- Program Structure
 - Front End
 - Handles interaction with the user
 - *Notebook* with cell groups
 - Kernel
 - Performs the computations
- Capital letters for all built-in functions
 - Plot[], Integrate[], DSolve[]
- Shift + Enter to run calculations in a notebook
- F1 for help with syntax and use of all built-in functions

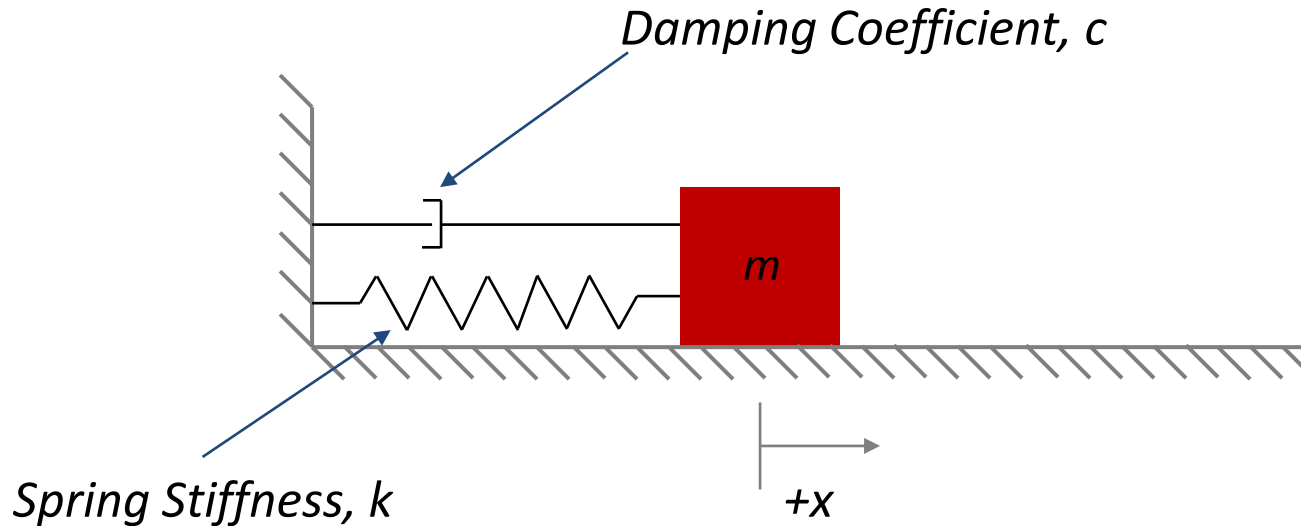
Damped Harmonic Oscillator



$$-cv = -c \frac{dx}{dt}$$



Damped Harmonic Oscillator



$$-kx - cv = ma$$

$$-kx - c \frac{dx}{dt} = m \frac{d^2x}{dt^2}$$

$$\frac{d^2x}{dt^2} + \frac{c}{m} \frac{dx}{dt} + \frac{k}{m} x = 0$$

Check out our website
(<http://asee.engin.umich.edu/>)

for upcoming

Workshops on Fundamental Engineering Skills:

- Advanced Plotting in MATLAB
- LaTeX
- SolidWorks
- Photoshop
- Illustrator