

Week 2

# **PHY 110C**

**Introduction to Data Analysis for Physics**

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# Overview

- Course Logistics
- Presentation of Solutions
- Discussion of Problems
- Overview of Reading
- Assignment 2 (and 1)

# Course Logistics

- Individual submissions
  - Note where you got help in comments
- Assignments due 5pm Wed (before class)
- No late grade, but presentation of solutions in class (can resubmit!)
- Grades are posted - questions go to Evan
  - Includes comments on submission
- Office Hours W 2-4 BIO 301 (on syllabus)
- Reading, assignment posted

# Solution Presentations

# Common Problems / Points for Discussion

- Capitalization
- [] vs. () vs. {}
- COMMENTS! (or text style for cell)
- Grouping statements (for grading)
- Function definition
- Problem 1 - Norm[list] vs. Norm[g[list]]
- Problem 2 - append, union, etc.
- Problem 3 - WOW!
- Template for solutions

# Modules

Modules - setting scope for variable

Default is global:

```
f = SoundNote[0]
```

```
(* new notebook *)
```

```
f[n_] := SoundNote[n]
```

Can help for making a “suite”:

```
Module[{f}, f[n_] := SoundNote[n]; Sound  
[f[0], f[4], f[7], f[12]]]
```

# Packages, Special Characters

Needed infrequently

Packages for “extending” *Mathematica*.

ErrorBarPlots

VectorAnalysis (in version 8)

Needs[“Package `”]

Special characters for making program pretty

\[Delta] \[Transpose]

# Tables and Matrices

Matrices are lists of lists

Can be “ragged” `{{1},{1,2,3}}`

Many built-in functions

Det, Transpose, Eigenvalues

Tables are a generator of lists

`Table[i^2, {i, 1, 10}]`

`data = Table[{Sin[i], Cos[i]}, {i, 1, 200}];`

Tables good for transformations too

`Table[{data[[i,2]], data[[i,1]] * 2 data[[i,2]]},  
{i,Length[data]}];`



# GRAPHS



# Graphs

Finally, expressing data!

MANY variants for making life easy

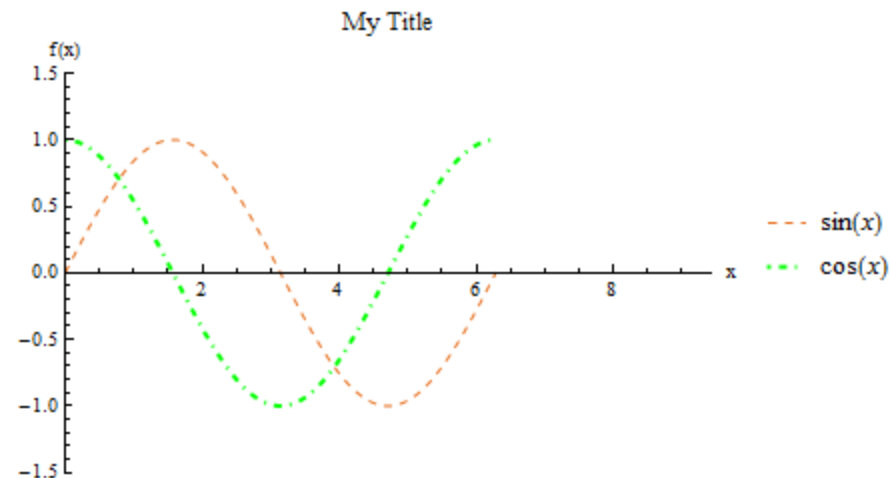
Plotting lists of data

Plotting functions

Setting axes, legends, color, etc.

SPOILER:

Can combine many plots of different types to create “professional” graphs (histogram data, theoretical values, fitted curve)



# Graphs

```
Plot[{Sin[x], Cos[x]}, {x, 0, 2 Pi}, AxesLabel ->
{"x", "f(x)"},
PlotLabel -> "My Title", PlotRange -> {{0, 3 Pi},
{-1.5, 1.5}},
PlotStyle -> {{RGBColor[0.900082, 0.425655,
0.093112], Dashed,
Thin}, {RGBColor[0, 1, 0], DotDashed, Thick}},
PlotLegends -> "Expressions"]
```

# Graphs

```
list = Table[Table[{a, a^2 + 50 Sin[c*a]},  
  {a, 0, 20}], {c, 0, 3};  
ListPlot[list,  
  PlotLegends -> {"data 1", "data 2", "data 3",  
  "data 4"},  
  PlotStyle -> PointSize[Medium]]
```

# Assignment 2

- [http://www.cs.utexas.edu/~evanott/PHY110C\\_Textbook/static/data\\_analysis/\\_downloads/assignment2.pdf](http://www.cs.utexas.edu/~evanott/PHY110C_Textbook/static/data_analysis/_downloads/assignment2.pdf)