CS101: Intro to Computing
Fall 2015

Lecture 26

Administrivia

- Homework 14 due tonight
- All grades should be finalized in Compass by Friday
  - Anything still missing, let us know by Monday
  - Even if you have already contacted us
  - E-mail Chelsea qsong6@illinois.edu

Administrivia

- Final exam
  - Practice exam released
  - December 15th 1:30pm-4:30pm (here)
  - Get approval for the conflict (email me)

REVIEW

Indexing Cell Arrays

- Works the same as regular arrays:

```
C={pi,[3,4,5;1,2,3],'Eight'}
C(2)
```

- ***DANGER***: This returns another cell array!!
- Indexing with curly brackets returns the value:

```
C{2}(2,3)
```

```
A=[1,2;3,4];
B=[4,3;2,1];
C=A+B

x=C(1,1)~=C(1,2) | C(1,1)
```

What is the value of x?

a) 0

b) 1

c) None of the above

```
A=1:10;
sum=0;
for x=1:2:10
    sum=sum+A(x);
end
disp(sum);
```

What value is displayed?

a) 3

b) 20

c) 25

d) 4

OVERVIEW

Course Summary (so far…)

1. Matlab fundamentals ✓
2. Data visualization ✓
3. Data wrangling
4. Simulation
5. Random processes
6. Optimization

READING DATA

Importing CSV Files

- Reads in data as a struct
- Usually two fields:
  - data - array of numeric data in the file
  - textdata - cell array of text data in the file
- Sometimes, also header attirbutes

```
C=importdata('Batting.csv');
disp(C.textdata(1,:));
x=C.data(:,12);
y=C.data(:,13);
plot(x,y,'.');
```

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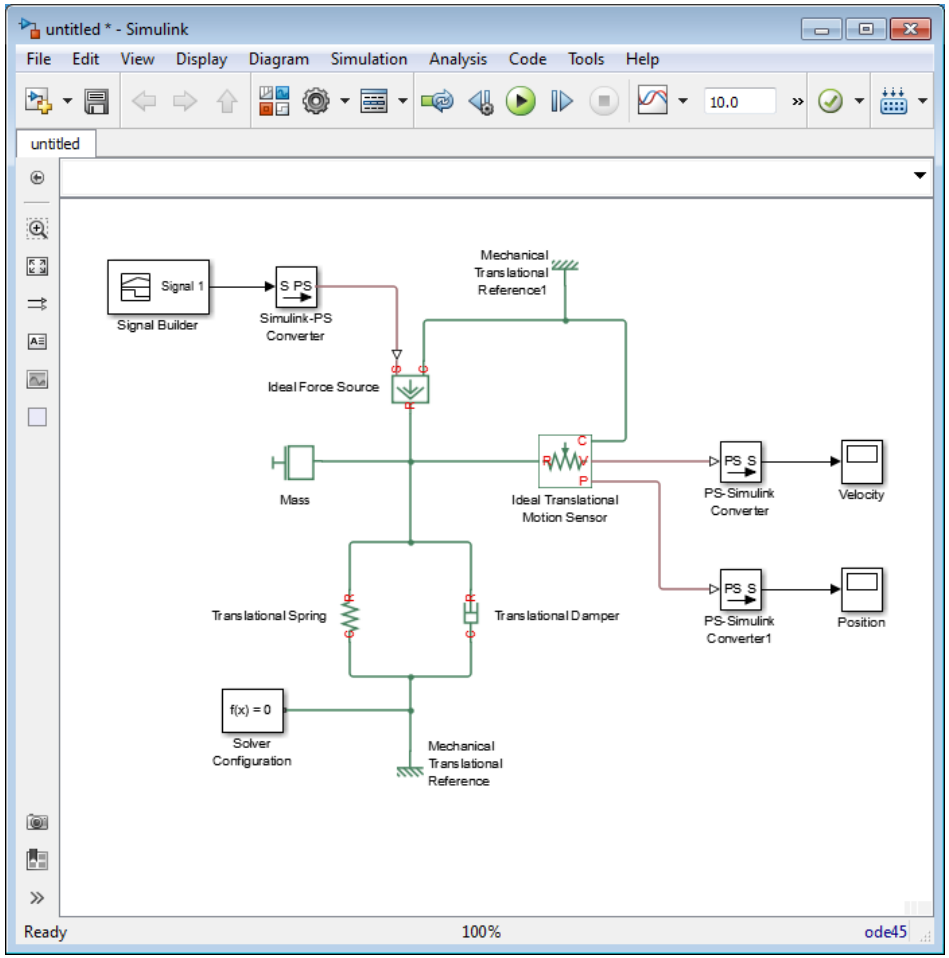
Simulation

- Simulations in Matlab are no different in principle from Python
- There are many nice features (e.g. animation) in Matlab
- Simulink is a graphical tool for creating simulations
  - Too much to learn in CS101

Simulink


untitled * - Simulink
File Edit View Display Diagram Simulation Analysis Code Tools Help
10.0
untitled
Signal 1
Signal Builder
S PS
Simulink-PS Converter
Mechanical Translational Reference1
Ideal Force Source
Mass
C
R
P
Ideal Translational Motion Sensor
PS S
PS-Simulink Converter
Velocity
PS S
PS-Simulink Converter1
Position
Translational Spring
Translational Damper
f(x) = 0
Solver Configuration
Mechanical Translational Reference
Ready
100%
ode45

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Random Variables

- Like numpy, Matlab has rand and randn
- Can produce arrays by supplying arguments

```
x=rand(3,3)+randn(3,3)
```

- randi produces random integers

```
y=randi(10)
```

- randperm produces permutation

```
z=randperm(6)
```

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Optimization

- We can use fminbnd, fminsearch
- Requires *function handles*, which we will not learn

```
fun=@(x)100*(x(2)-x(1)^2)^2+(1-
x(1))^2;
[x,funx]=fminsearch(fun,[-2,2])
```

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