Intro to Python Part 4
ME 458 Lecture 4

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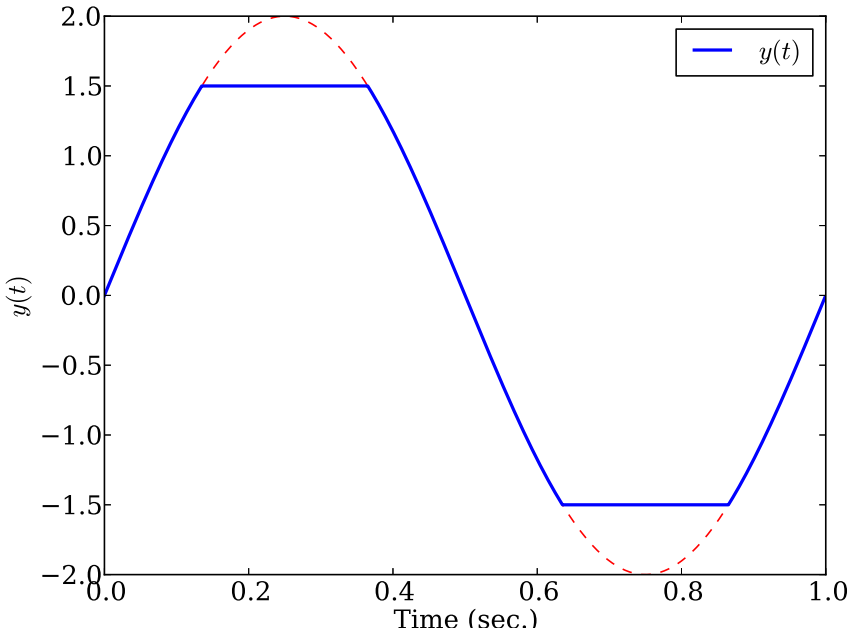
Learning Outcomes

Students will

- understand various approaches to working with conditions on vectors

Working with conditions on arrays

- (starting the next lecture)
- $y = 2\sin(2\pi t)$ but saturates when $|y| > 1.5$
- write code to recreate the solid line for $y(t)$ in this figure:



Thinking it through

- too often, we tend to just "start coding" rather than thinking through our solution first
- try to modularize your code as much as possible
  - eventually, think through small functions that can help you along the way
  - probably not necessary here
- what steps do you need to complete to generate the figure?
- outline and draft your code on the following slides

outline

code draft

Debriefing various approaches

What's wrong with this?

```
from matplotlib.pyplot import *
from scipy import *

t = arange(0,1,0.01)
y = 2.0*sin(2*pi*t)

if y > 1.5:
    y = 1.5
elif y < 1.5:
    y = -1.5
```

Discuss my solutions

enumerate

```
mylist = ['a','b','c','d']

for i, item in enumerate(mylist):
    print('i = ' + str(i))
    print('item = ' + str(item))
    print('==================')
```

- what do you expect the output to be?

The where function

- think of `where` as a vectorized **`if`**, or **`if`** wrapped in a **`for`** loop
- it returns an array of indices where the condition is satisfied
- it is designed for 2D arrays or matrices, so you if you have a vector or 1D array, you need to put `[0]` to get the first element in the list of answers:

```
In [1]: myarray = array([2,3,4])

In [2]: where(myarray>2)
Out[2]: (array([1, 2]),)

In [3]: inds = where(myarray>2)[0]

In [3]: myarray[inds]
Out[3]: array([3, 4])
```


Discuss where based solution

- my code