

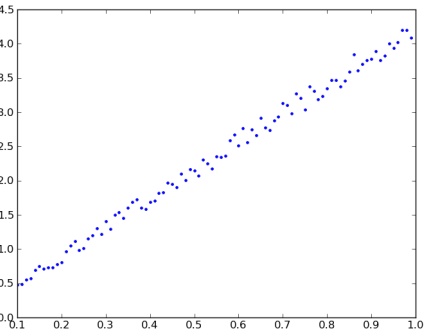
Exercises

FOSSEE

Department of Aerospace Engineering
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Day 1, Session 5

Problem 1



Example code

```
l = []
t = []
for line in open('pendulum.txt'):
    point = line.split()
    l.append(float(point[0]))
    t.append(float(point[1]))
plot(l, t, '.')
```

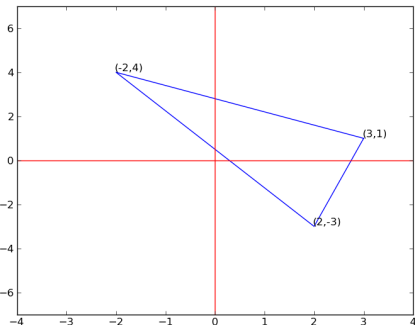
Problem Statement

Tweak above code to plot data in file 'pos.txt'.

Problem 1 cont...

- Label both the axes.
- What kind of motion is this?
- Title the graph accordingly.
- Annotate the position where vertical velocity is zero.

Problem 2



Plot points given x and y coordinates

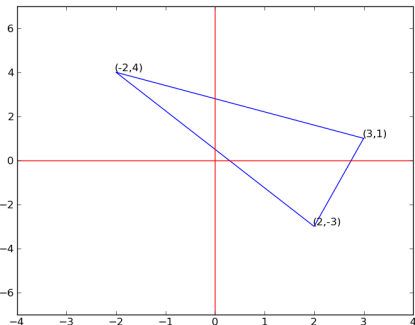
```
In []: x = [3, 2, -2, 3]
In []: y = [1, -3, 4, 1]
In []: plot(x, y)
```

Line can be plotted using arrays of coordinates.

Problem statement

Write a Program that plots a regular n-gon(Let $n = 5$).

Problem 2



Plot points given x and y coordinates

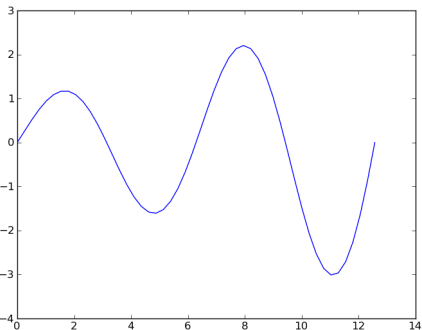
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Problem 3

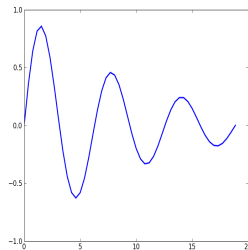
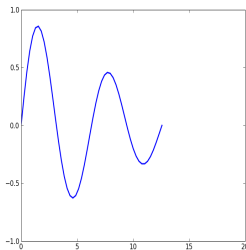
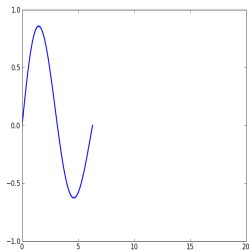


Damped Oscillation

```
In []: x = linspace(0, 4*pi)
In []: plot(x, exp(x/10)*sin(x))
```

Problem 3 cont...

Create a sequence of images in which the damped oscillator($e^{-x/10}\sin(x)$) slowly evolves over time.



Hint

```
savefig('plot'+str(i)+' .png') #i is int variable
```

Problem 4

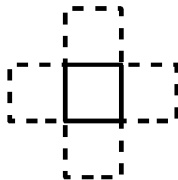
```
In []: x = imread('smoothing.png')
```

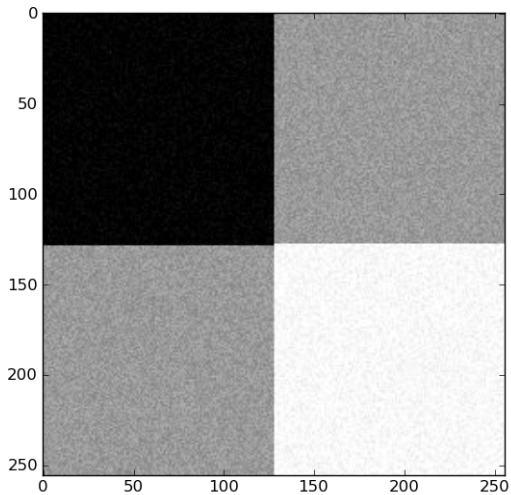
```
In []: x.shape
```

```
Out []: (256, 256)
```

```
In []: imshow(x, cmap=cm.gray)
```

Replace each pixel with mean of neighboring pixels

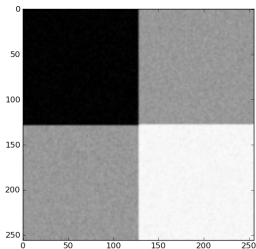
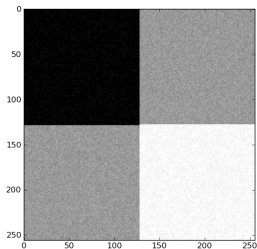




Problem 4: Approach

For y being resultant image:

$$y[1, 1] = x[0, 1]/4 + x[1, 0]/4 \\ + x[2, 1]/4 + x[1, 2]/4$$



Hint:

Use array Slicing.

Solution

```
In []: y = zeros_like(x)
In []: y[1:-1,1:-1] = x[:-2,1:-1]/4+
        x[2:,1:-1]/4+
        x[1:-1,2:]/4+
        x[1:-1,:-2]/4
In []: imshow(y, cmap=cm.gray)
```