Taller 6

Métodos Computacionales para Políticas Públicas - URosario

Entrega: viernes 16-oct-2020 11:59 PM

"Nicolás Garcés R"

[nicolas.garces@urosario.edu.co]

Instrucciones:

- Guarde una copia de este *Jupyter Notebook* en su computador, idealmente en una carpeta destinada al material del curso.
- Modifique el nombre del archivo del *notebook*, agregando al final un guión inferior y su nombre y apellido, separados estos últimos por otro guión inferior. Por ejemplo, mi *notebook* se llamaría: *mcpp_taller6_santiago_matallana*
- Marque el *notebook* con su nombre y e-mail en el bloque verde arriba. Reemplace el texto "[Su nombre aquí]" con su nombre y apellido. Similar para su e-mail.
- Desarrolle la totalidad del taller sobre este *notebook*, insertando las celdas que sea necesario debajo de cada pregunta. Haga buen uso de las celdas para código y de las celdas tipo *markdown* según el caso.
- Recuerde salvar periódicamente sus avances.
- Cuando termine el taller:
  1. Descárguelo en PDF. Si tiene algún problema con la conversión, descárguelo en HTML.
  2. Suba todos los archivos a su repositorio en GitHub, en una carpeta destinada exclusivamente para este taller, antes de la fecha y hora límites.

(Todos los ejercicios tienen el mismo valor.)

In [ ]:

In [ ]:

In [ ]:

Resuelva la parte 1 de este documento.

In [2]:
```
import numpy as np
import scipy.linalg as laimport
import matplotlib.pyplot as plt
```

1. Choose a value and set the variable x to that value.

In [2]:
```
x = 27
```

1. What is command to compute the square of x? Its cube?

In [6]:
```
np.square(x)
```

Out[6]: 729

In [7]:
```
np.power(x,3)
```

Out[7]: 19683

1. Choose an angle θ and set the variable theta to its value (a number).

In [9]:
```
theta= np.radians(45)
```

1. What is sinθ? cosθ? Angles can be measured in degrees or radians.Which of these are being used used?

In [10]:
```
np.sin(theta)
```

Out[10]: 0.7071067811865475

In [11]:
```
np.cos(theta)
```

Out[11]: 0.7071067811865476

Angles are in radians

1. Use themp.linspace function to create a row vector called meshPoints containing exactly 500 values with values evenly spaced between -1 and 1.

In [15]:
```
meshPoints=np.linspace(-1,1,500)
```

1. What expression will yield the value of the 52thelement ofmeshPoints?What is this value?

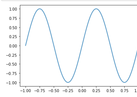
In [16]:
```
meshPoints[52]
```

Out[16]: -0.7915831663326653

1. Produce a plot of a sinusoid

In [18]:
```
pi=3.1416
```

In [21]:
```
plt.plot(meshPoints,np.sin(2*pi*meshPoints))
plt.savefig('plot.jpg');
```



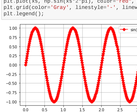
Resuelva los ejercicios de las secciones 4.1, 5.1, 6.1, 7.4 y 8.5 de este documento.

In [2]:
```
import matplotlib.pylab as plt
import numpy as np
```

4.1

- 1.Plot a simple graph of a sinus function in the range 0 to 3 with a step size of 0.01.""
- 2.Make the line red.Add diamond-shaped markers with size of 5.
- 3.Add a legend and a grid to the plot.

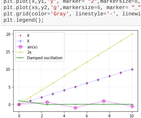
In [26]:
```
xs = np.arange(0,3,0.01)
plt.plot(xs, np.sin(xs*2*pi), color="red", marker="D",markersize=5,label="sin(x)")
plt.grid(color='Gray', linestyle='-', linewidth=0.5)
plt.legend();
```



5.1

Apply different line styles to a plot. Change line color and thickness as well as the size and the kind ofthe marker. Experiment with different styles

In [33]:
```
x = range(0,11)
y = range (0,11)
y1 = [0,2,4,6,8,10,12,14,16,18,20]
y2 = [0,1,4,9,16,25,36,49,64,81,100]
y2 = np.sin(2 * np.pi * xs) * np.exp( xs)
plt.plot(x,y,'r+',alpha= 1,label="X")
plt.plot(x,y,'b',marker="D",alpha= 0.2,label="X")
plt.plot(xs, np.sin(xs), color="m", marker="o",markersize=9,label="sin(x)",alpha= 0.4)
plt.plot(x,y1,'y', marker= "2",markersize=8,label="2x",alpha= 0.5)
plt.plot(xs,y2,'g',markersize=6, marker= "_",label="Damped oscillation", alpha=0.8)
plt.grid(color='Gray', linestyle='-', linewidth=0.1)
plt.legend();
```

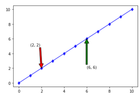


6.1

Annotate a line at two places with text. Use green and red arrows and align it according to figurepoints and data.

In [91]:
```
plt.plot(x,y,'b',marker="d",alpha= 0.8,label="X")
plt.annotate('(2, 2)', xy = (2, 2), xytext=(1,5),arrowprops={'facecolor': 'r'})
plt.annotate('(6, 6)', xy = (6, 6), xytext=(6,2),arrowprops={'facecolor': 'g'})
```

Out[91]: Text(6, 2, '(6, 6)')

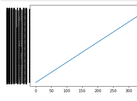


7.4

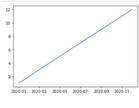
- 1.Plot a graph with dates for one year with daily values at the x axis using the built-in module datetime.
- 2.Format the dates in such a way that only the first day of the month is shown.
- 3.Display the dates with and without the year. Show the month as number and as first three letters of themonth name.

In [74]:
```
import datetime as dt
```

In [86]:
```
start= dt.datetime(2020,1,1,0,0,0)
end= dt.datetime(2020,12,31,0,0,0)
delta = end - start
dates = [(start + dt.timedelta(days= d)).strftime("%Y-%m-%d")for d in range((end-start).days
+1)]
plt.plot(dates);
```



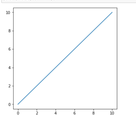
In [87]:
```
days= [dt.datetime(2020,1,1,0,0,0),
dt.datetime(2020,2,1,0,0,0),
dt.datetime(2020,3,1,0,0,0),
dt.datetime(2020,4,1,0,0,0),
dt.datetime(2020,5,1,0,0,0),
dt.datetime(2020,6,1,0,0,0),
dt.datetime(2020,7,1,0,0,0),
dt.datetime(2020,8,1,0,0,0),
dt.datetime(2020,9,1,0,0,0),
dt.datetime(2020,10,1,0,0,0),
dt.datetime(2020,11,1,0,0,0),
dt.datetime(2020,12,1,0,0,0)]

y=[1,2,3,4,5,6,7,8,9,10,11,12]

plt.plot(days,y);
```

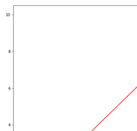


8.5

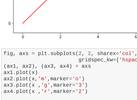
- 1.Draw two figures, one 5 by 5, one 10 by 10 inches.
- 2.Add four subplots to one figure. Add labels and ticks only to the outermost axes.
- 3.Place a small plot in one bigger plot.

In [118]:
```
plt.figure(figsize=(5, 5))
plt.plot(x)
plt.figure(figsize=(10, 10))
plt.plot(x, 'r');
```

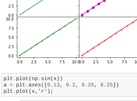




In [34]:
```
fig, axs = plt.subplots(2, 2, sharex='col', sharey='row',
                        gridspec_kw={'hspace': 0, 'wspace': 0})
(ax1, ax2), (ax3, ax4) = axs
ax1.plot(x)
ax2.plot(x,'m',marker='o')
ax3.plot(x ,'g',marker='3')
ax4.plot(x ,'r',marker='2')

for ax in axs.flat:
    ax.label_outer()
```



In [50]:
```
plt.plot(np.sin(x))
a = plt.axes([0.13, 0.2, 0.25, 0.25])
plt.plot(x, 'r');
```



In [ ]: