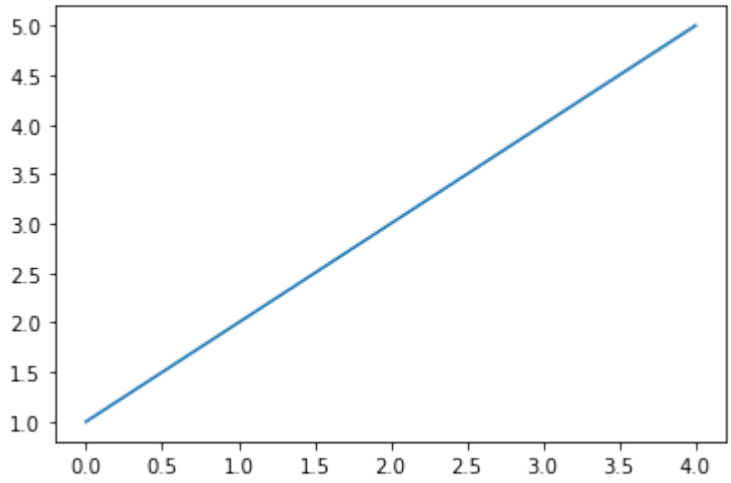
Data Visualization using Matplotlib

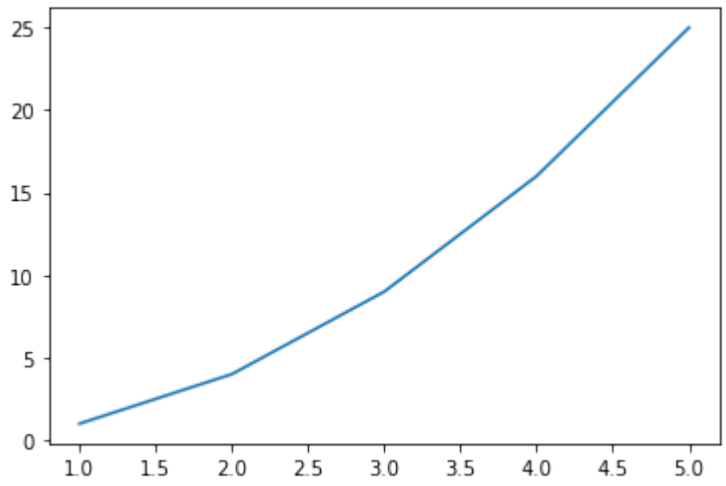
In [3]:
```
import matplotlib.pyplot as plt
```

LINE PLOT

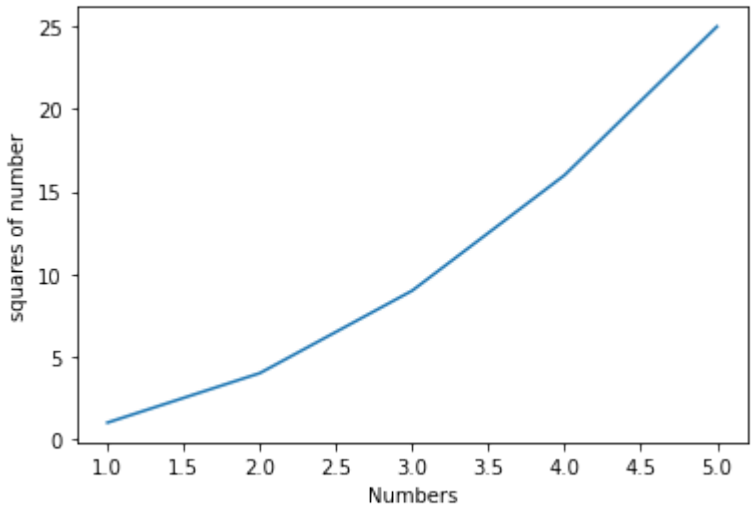
In [4]:
```
data=[1,2,3,4,5]
plt.plot(data)
plt.show()
```



In [7]:
```
x_data=[1,2,3,4,5]
y_data=[1,4,9,16,25]
plt.plot(x_data,y_data)
plt.show()
```

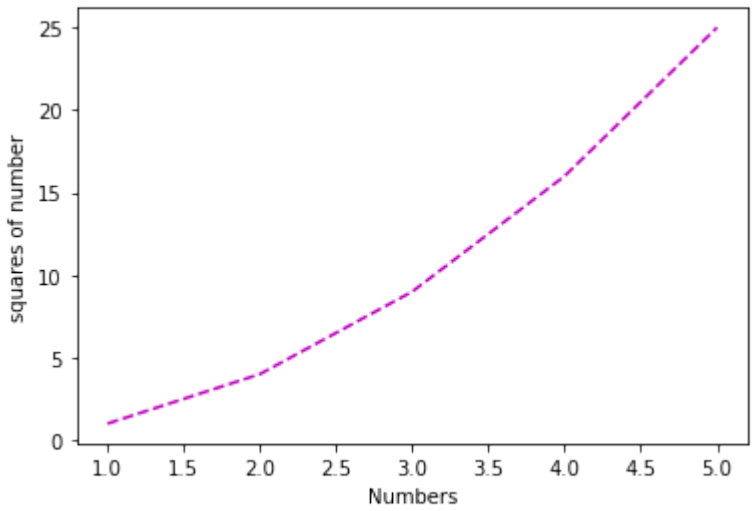


In [11]:
```
x_data=[1,2,3,4,5]
y_data=[1,4,9,16,25]
plt.plot(x_data,y_data)
plt.xlabel("Numbers")
plt.ylabel("squares of number")
plt.show()
```



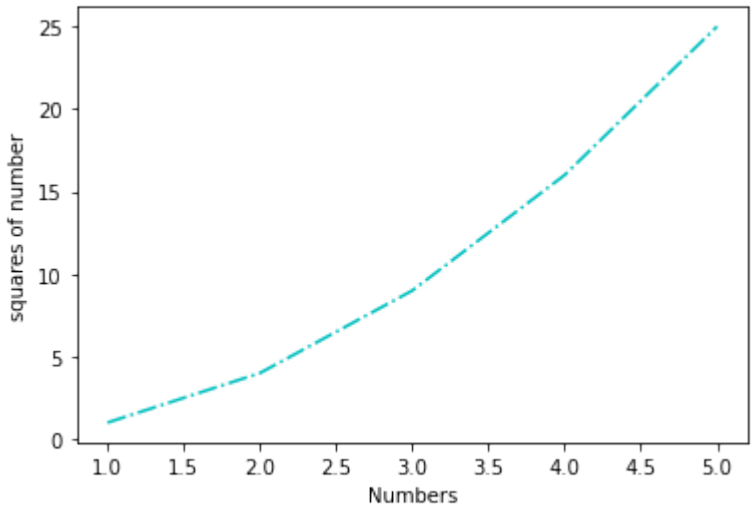
In [13]:

```
x_data=[1,2,3,4,5]
y_data=[1,4,9,16,25]
plt.plot(x_data,y_data,'--m')
plt.xlabel("Numbers")
plt.ylabel("squares of number")
plt.show()
```



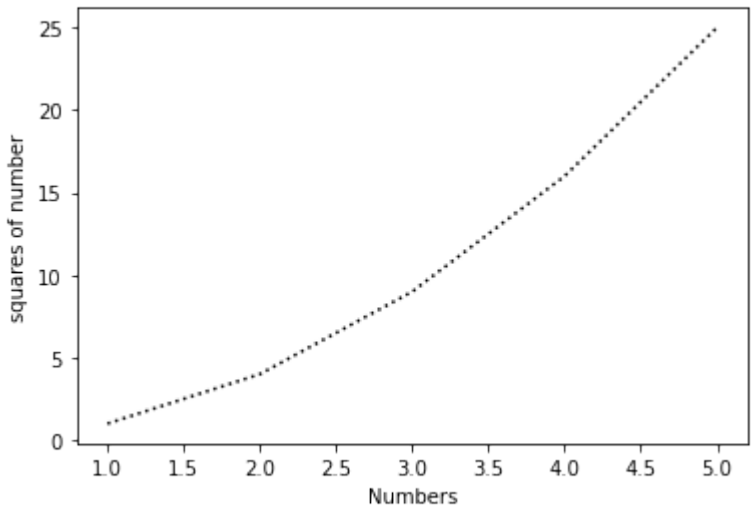
In [14]:

```
x_data=[1,2,3,4,5]
y_data=[1,4,9,16,25]
plt.plot(x_data,y_data,'-.c')
plt.xlabel("Numbers")
plt.ylabel("squares of number")
plt.show()
```



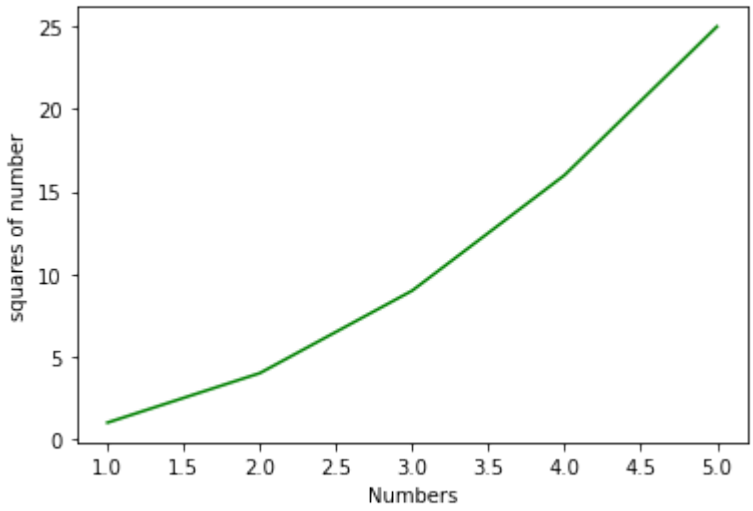
In [15]:

```
x_data=[1,2,3,4,5]
y_data=[1,4,9,16,25]
plt.plot(x_data,y_data,':k')
plt.xlabel("Numbers")
plt.ylabel("squares of number")
plt.show()
```



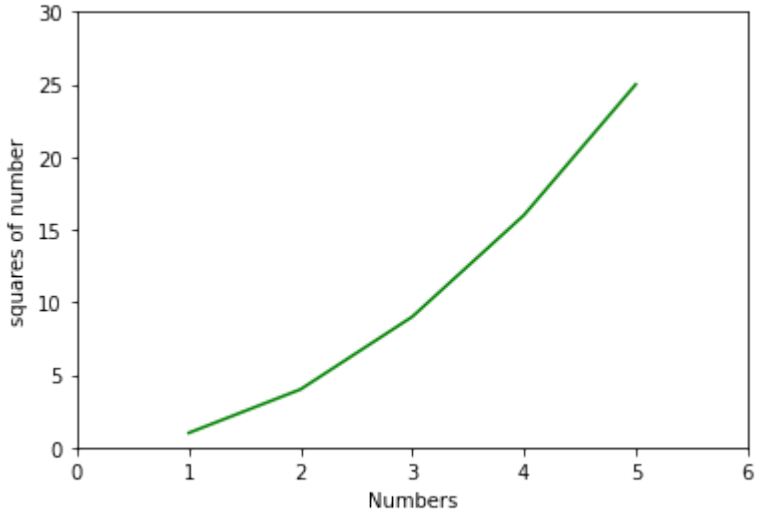
In [16]:

```
x_data=[1,2,3,4,5]
y_data=[1,4,9,16,25]
plt.plot(x_data,y_data,'-g')
plt.xlabel("Numbers")
plt.ylabel("squares of number")
plt.show()
```



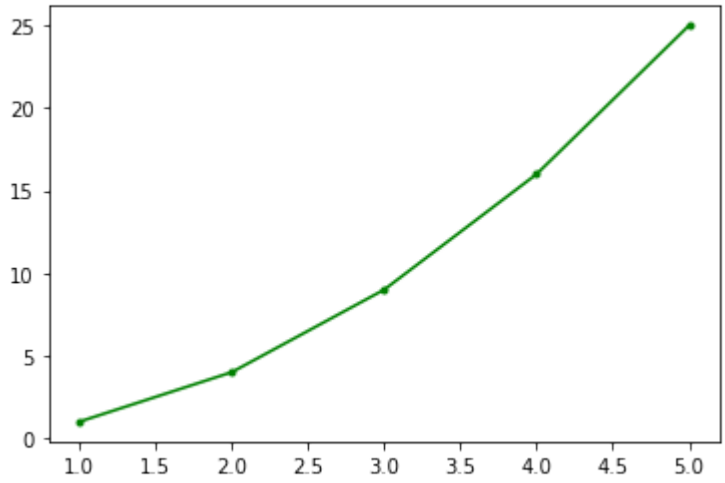
In [17]:

```
x_data=[1,2,3,4,5]
y_data=[1,4,9,16,25]
plt.plot(x_data,y_data,'-g')
plt.xlabel("Numbers")
plt.ylabel("squares of number")
plt.axis([0,6,0,30])
plt.show()
```

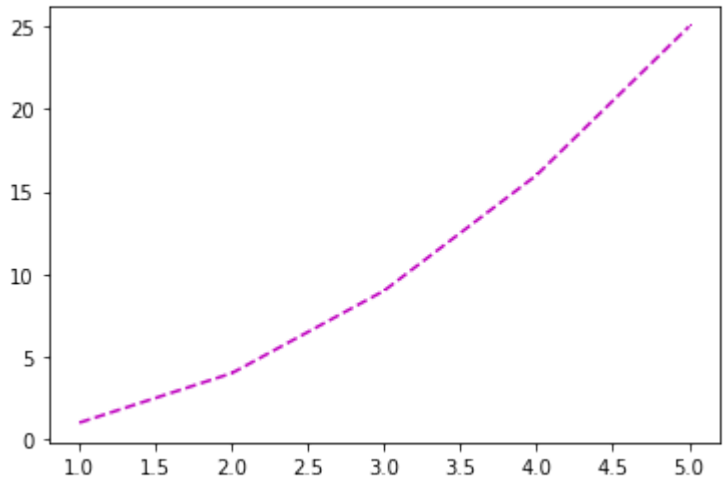


In [18]:

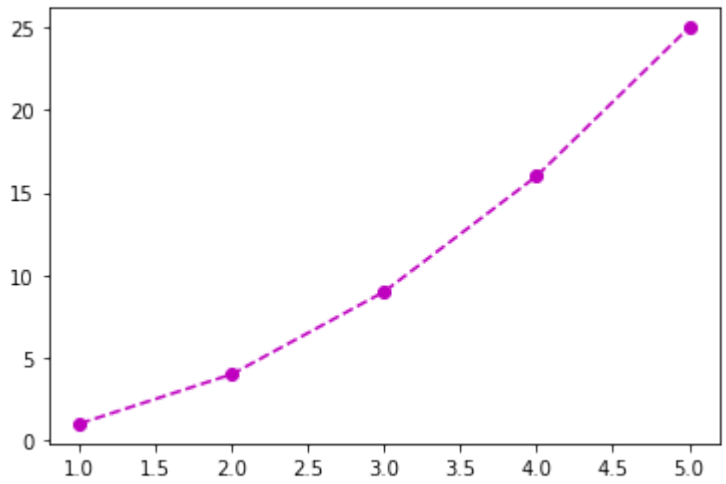
```
plt.plot(x_data,y_data,'.-g')
plt.show()
```



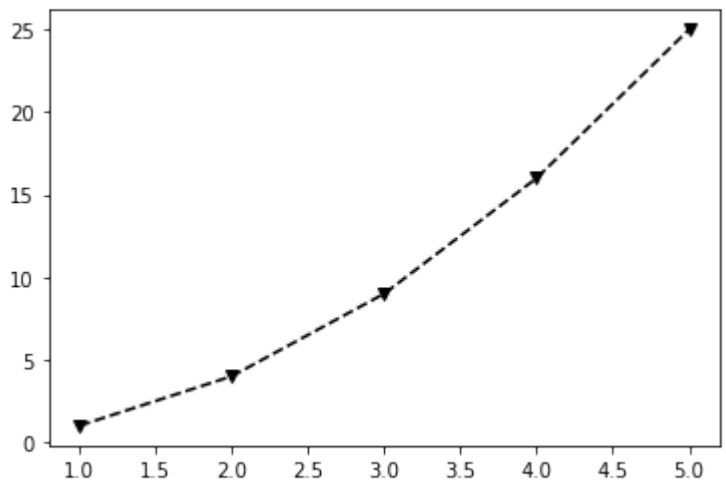
In [20]:
```
plt.plot(x_data,y_data,',--m')
plt.show()
```



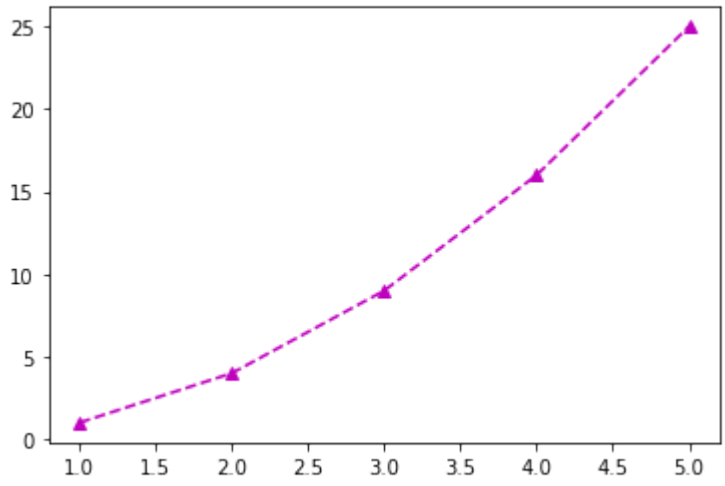
In [21]:
```
plt.plot(x_data,y_data,'o--m')
plt.show()
```



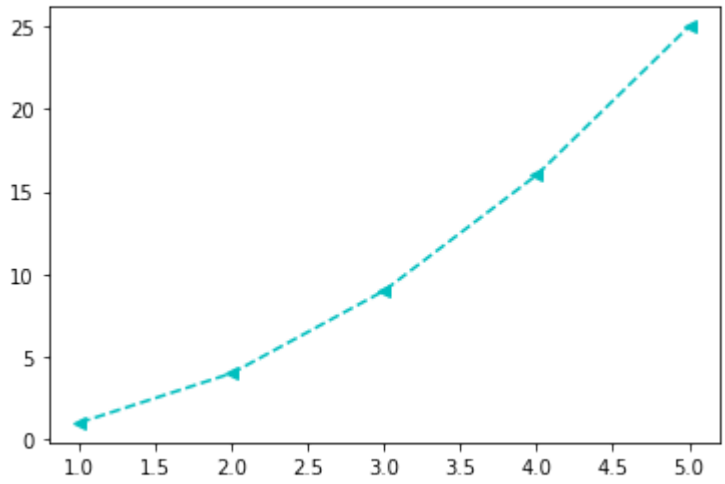
In [22]:
```
plt.plot(x_data,y_data,'v--k')
plt.show()
```



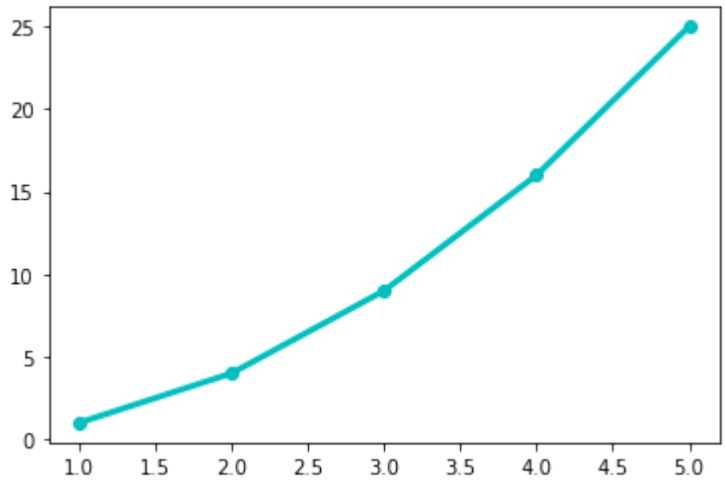
In [23]:
```
 plt.plot(x_data,y_data,'^--m')
plt.show()
```



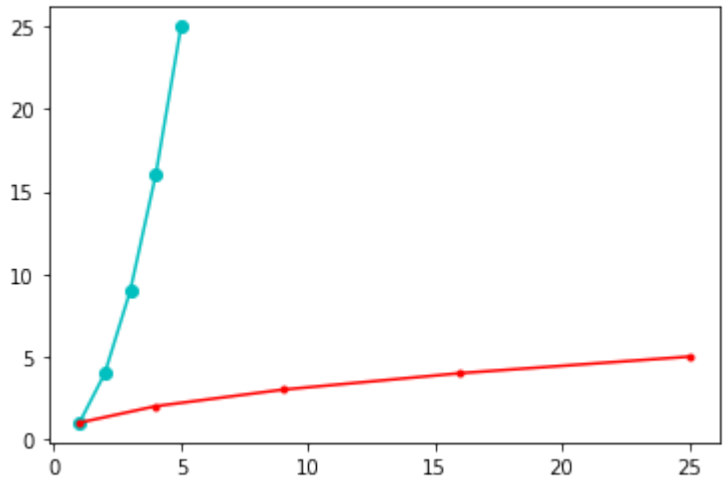
In [24]:
```
plt.plot(x_data,y_data,'<--c')
plt.show()
```



In [26]:
```
plt.plot(x_data,y_data,'o-c',linewidth=3)
plt.show()
```



In [28]:
```
plt.plot(x_data,y_data,'o-c')
plt.plot(y_data,x_data,'.-r')
plt.show()
```



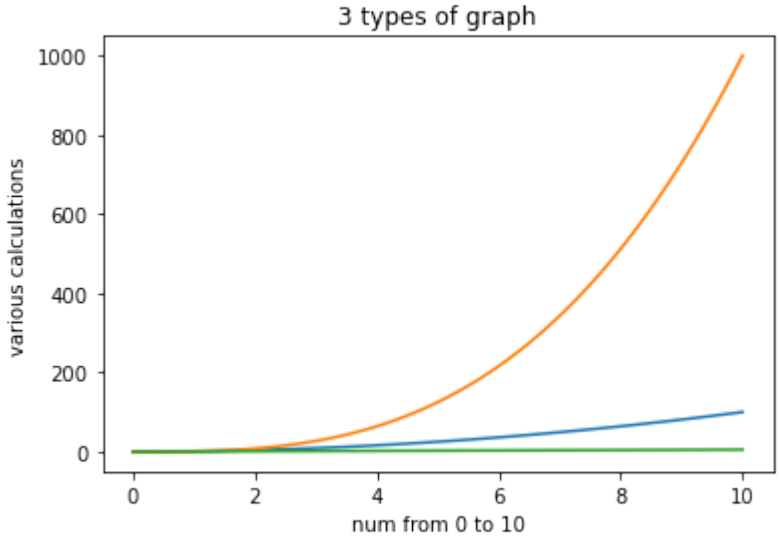
In [29]:
```
import numpy as np
```

In [31]:
```
x_data=np.linspace(0,10,100)
print(x_data)
```

```
[ 0.         0.1010101  0.2020202  0.3030303  0.4040404  0.50505051
  0.60606061 0.70707071 0.80808081 0.90909091 1.01010101 1.11111111
  1.21212121 1.31313131 1.41414141 1.51515152 1.61616162 1.71717172
  1.81818182 1.91919192 2.02020202 2.12121212 2.22222222 2.32323232
  2.42424242 2.52525253 2.62626263 2.72727273 2.82828283 2.92929293
  3.03030303 3.13131313 3.23232323 3.33333333 3.43434343 3.53535354
  3.63636364 3.73737374 3.83838384 3.93939394 4.04040404 4.14141414
  4.24242424 4.34343434 4.44444444 4.54545455 4.64646465 4.74747475
  4.84848485 4.94949495 5.05050505 5.15151515 5.25252525 5.35353535
  5.45454545 5.55555556 5.65656566 5.75757576 5.85858586 5.95959596
  6.06060606 6.16161616 6.26262626 6.36363636 6.46464646 6.56565657
  6.66666667 6.76767677 6.86868687 6.96969697 7.07070707 7.17171717
  7.27272727 7.37373737 7.47474747 7.57575758 7.67676768 7.77777778
  7.87878788 7.97979798 8.08080808 8.18181818 8.28282828 8.38383838
  8.48484848 8.58585859 8.68686869 8.78787879 8.88888889 8.98989899
  9.09090909 9.19191919 9.29292929 9.39393939 9.49494949 9.5959596
  9.6969697  9.7979798  9.8989899  10.        ]
```

In [32]:
```
y1=x_data**2
y2=x_data**3
y3=x_data*0.5
plt.plot(x_data,y1)
plt.plot(x_data,y2)
plt.plot(x_data,y3)
plt.xlabel("num from 0 to 10")
plt.ylabel("various calculations")
plot_title=input("enter the plot title:")
plt.title(plot_title)
plt.show()
```

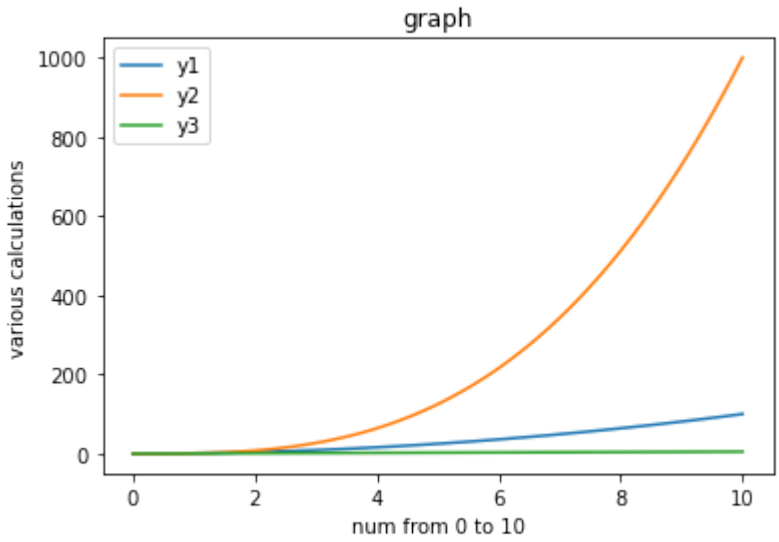
```
enter the plot title:3 types of graph
```



In [34]:

```
plt.plot(x_data,y1)
plt.plot(x_data,y2)
plt.plot(x_data,y3)
plt.xlabel("num from 0 to 10")
plt.ylabel("various calculations")
plot_title=input("enter the plot title:")
plt.title(plot_title)
plt.legend(["y1","y2","y3"])
plt.show()
```

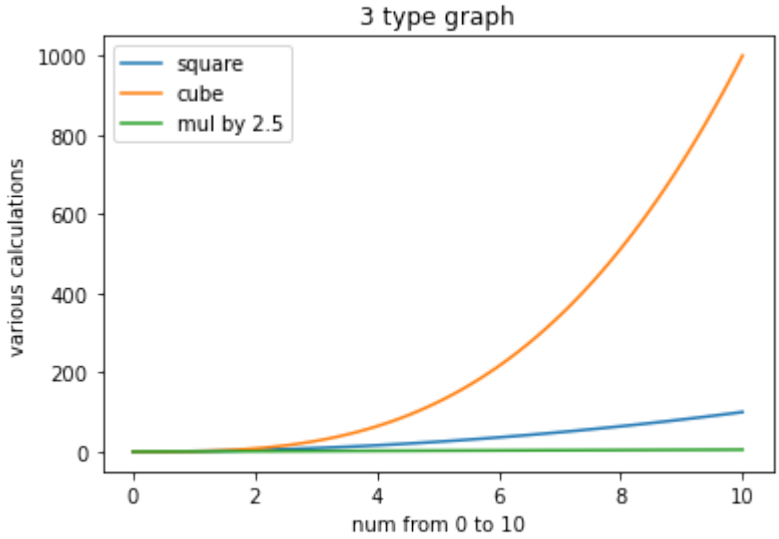
```
enter the plot title:graph
```



In [35]:

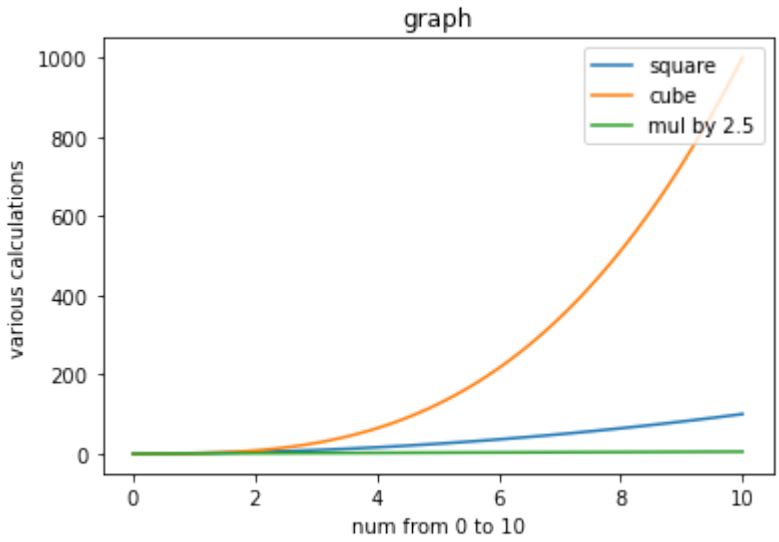
```
plt.plot(x_data,y1,label="square")
plt.plot(x_data,y2,label="cube")
plt.plot(x_data,y3,label="mul by 2.5")
plt.xlabel("num from 0 to 10")
plt.ylabel("various calculations")
plot_title=input("enter the plot title:")
plt.title(plot_title)
plt.legend()
plt.show()
```

```
enter the plot title:3 type graph
```



In [36]:
```
plt.plot(x_data,y1,label="square")
plt.plot(x_data,y2,label="cube")
plt.plot(x_data,y3,label="mul by 2.5")
plt.xlabel("num from 0 to 10")
plt.ylabel("various calculations")
plot_title=input("enter the plot title:")
plt.title(plot_title)
plt.legend(loc="upper right")
plt.show()
```

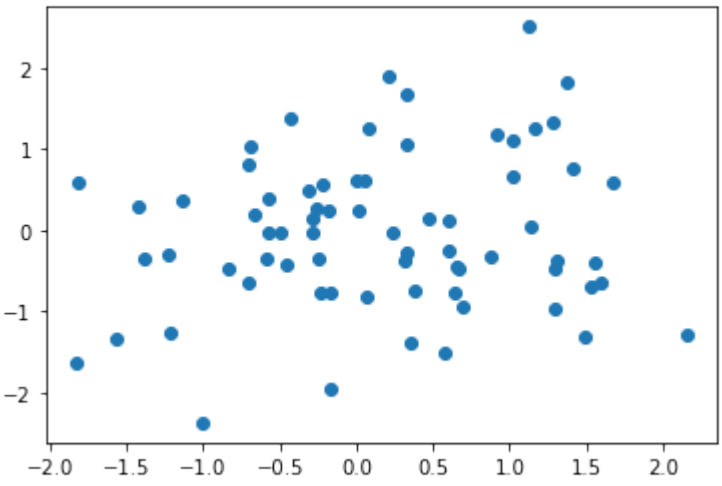
```
enter the plot title:graph
```



SCATTER PLOT

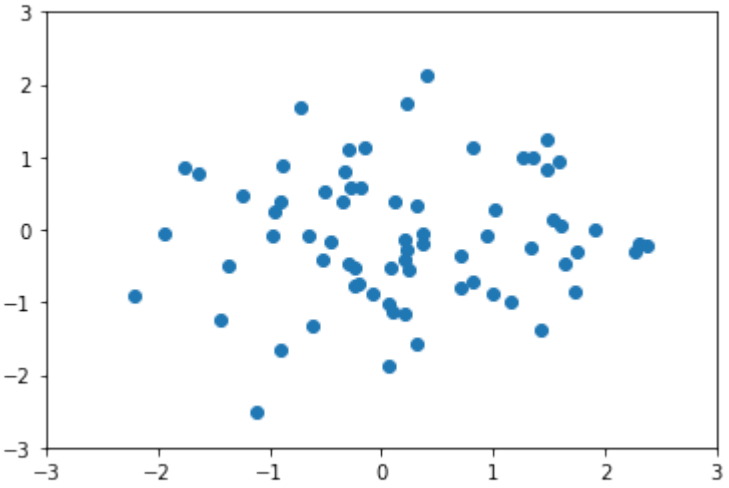
In [37]:
```
import matplotlib.pyplot as plt
import numpy as np
```

In [38]:
```
y1=np.random.randn(70)
y2=np.random.randn(70)
plt.scatter(y1,y2)
plt.show()
```



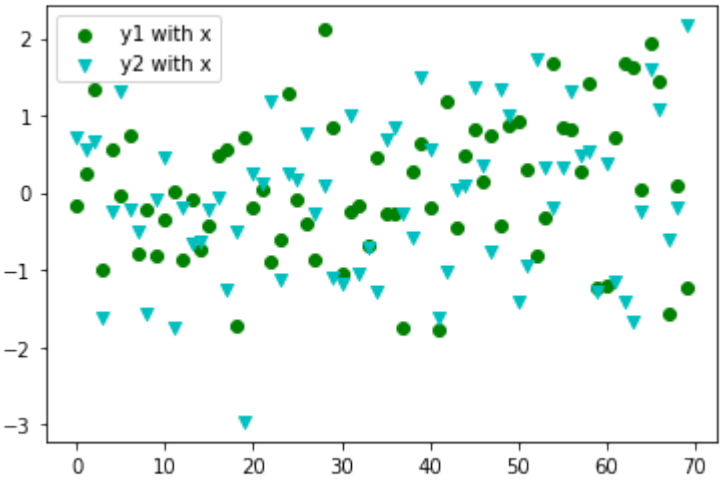
In [39]:

```
y1=np.random.randn(70)
y2=np.random.randn(70)
plt.scatter(y1,y2)
plt.axis([-3,3,-3,3])
plt.show()
```



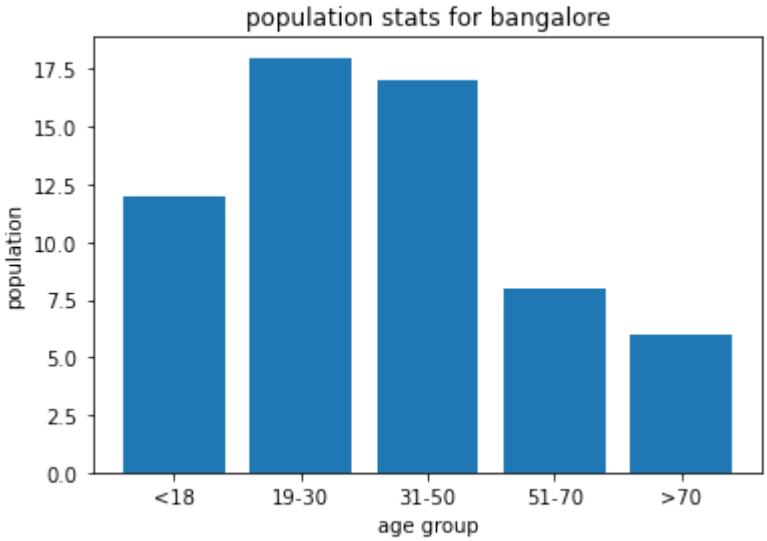
In [42]:

```
x=np.arange(70)
y1=np.random.randn(70)
y2=np.random.randn(70)
plt.scatter(x,y1,marker="o",label="y1 with x",c="g")
plt.scatter(x,y2,marker="v",label="y2 with x",c="c")
plt.legend()
plt.show()
```

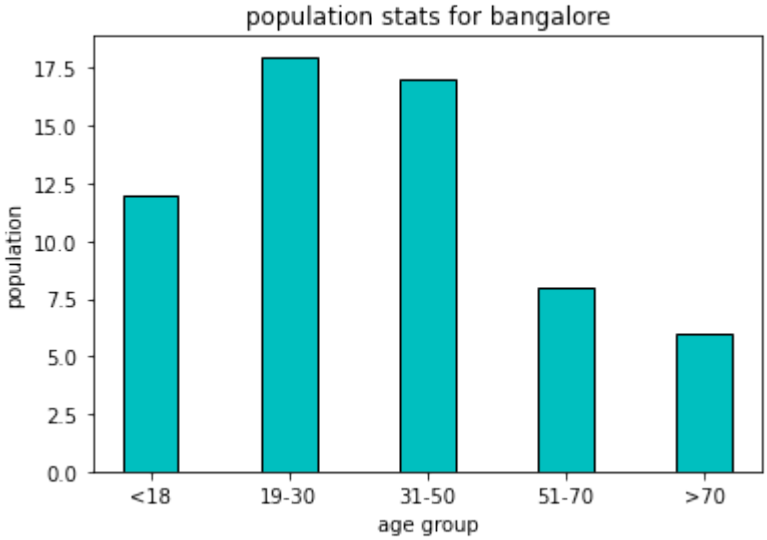


BAR PLOT

In [43]:
```
age_group=["<18","19-30","31-50","51-70",">70"]
total_num=[12,18,17,8,6]
plt.bar(age_group,total_num)
plt.xlabel("age group")
plt.ylabel("population")
plt.title("population stats for bangalore")
plt.show()
```

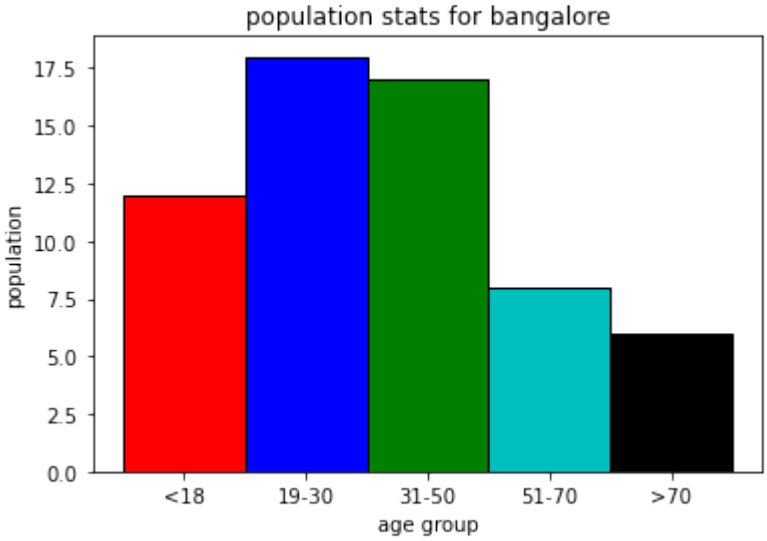


In [44]:
```
age_group=["<18","19-30","31-50","51-70",">70"]
total_num=[12,18,17,8,6]
plt.bar(age_group,total_num,color="c",edgecolor='k',width=0.4)
plt.xlabel("age group")
plt.ylabel("population")
plt.title("population stats for bangalore")
plt.show()
```



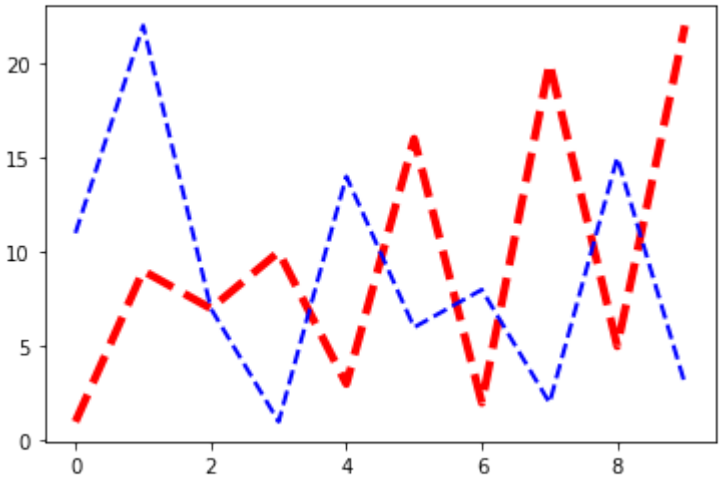
In [48]:
```
age_group=["<18","19-30","31-50","51-70",">70"]
total_num=[12,18,17,8,6]
colors=["r",'b','g','c','k']
plt.bar(age_group,total_num,color=colors,edgecolor='k',width=1.0)
plt.xlabel("age group")
plt.ylabel("population")
```

```
plt.title("population stats for bangalore")
plt.show()
```



In [51]:

```
x=np.arange(10)
y1=[1,9,7,10,3,16,2,20,5,22]
y2=[11,22,7,1,14,6,8,2,15,3]
plt.plot(x,y1,"--r",linewidth=4)
plt.plot(x,y2,"--b",linewidth=2)
plt.show()
```

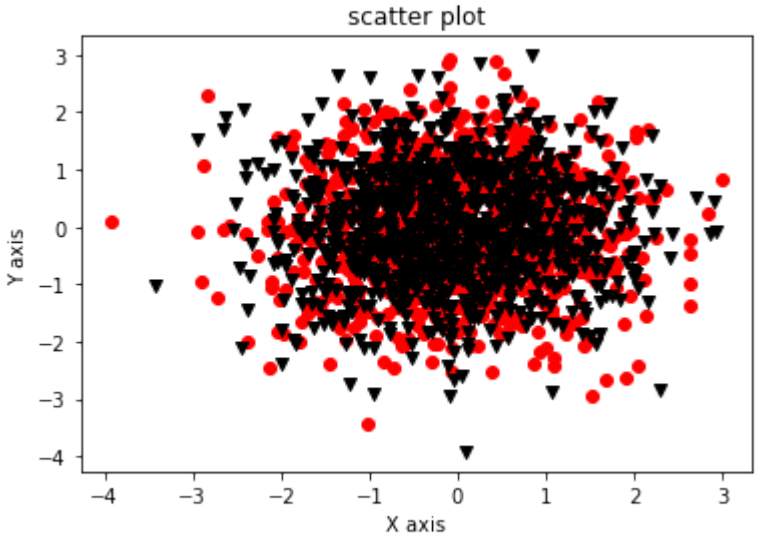


In [53]:

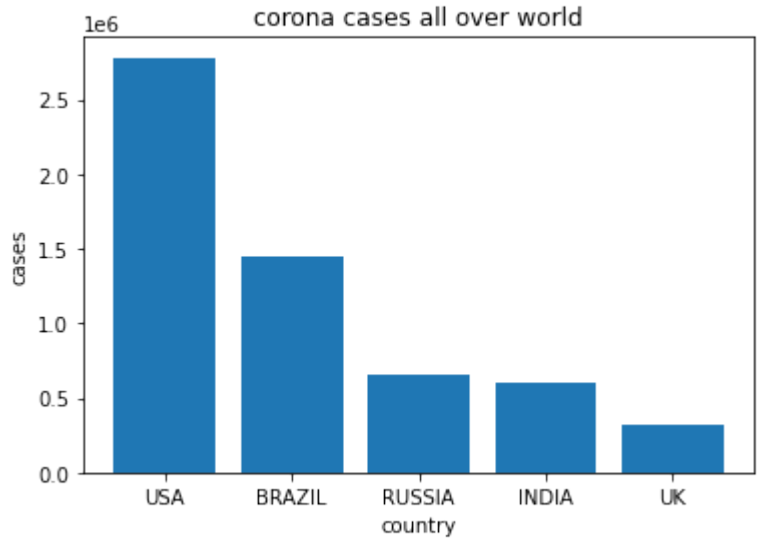
```
import matplotlib.pyplot as plt
import numpy as np
x=np.random.randn(1000)
y=np.random.randn(1000)
plt.scatter(x,y,marker='o',c='r',label="x with y")
plt.scatter(y,x,marker='v',c='k',label="y with x")
plt.xlabel("X axis")
plt.ylabel("Y axis")
plt.title("scatter plot")
```

Out[53]:

```
Text(0.5, 1.0, 'scatter plot')
```



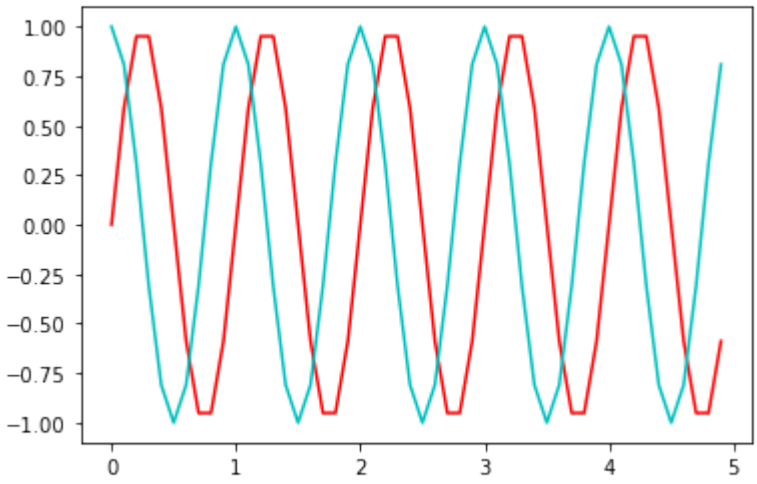
In [57]:
```
import matplotlib.pyplot as plt
import numpy as np
country=["USA",'BRAZIL','RUSSIA','INDIA','UK']
total_cases=[2779953,1453369,654405,605220,313483]
plt.bar(country,total_cases)
plt.xlabel("country")
plt.ylabel("cases")
plt.title("corona cases all over world")
plt.show()
```



USING SUBPLOT TO PLOT MULTIPLE PLOTS WITHIN SAME ROW OR COLUMN

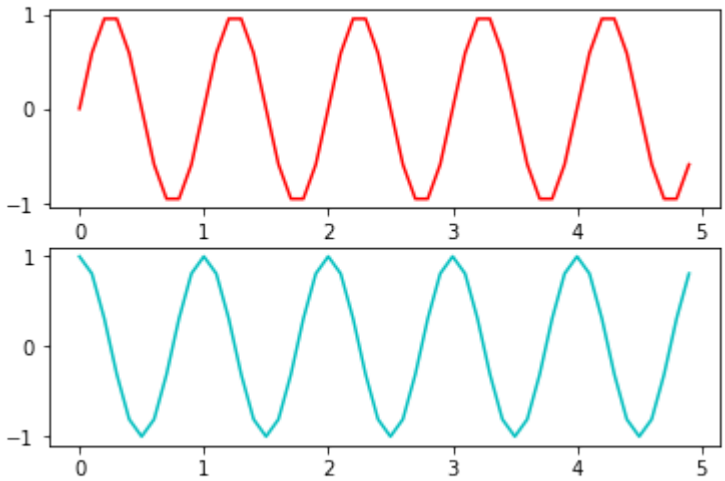
In [1]:
```
import matplotlib.pyplot as plt
import numpy as np
```

In [2]:
```
t1=np.arange(0.0,5.0,0.1)
y1=np.sin(2*np.pi*t1)
y2=np.cos(2*np.pi*t1)
plt.plot(t1,y1,'r')
plt.plot(t1,y2,'c')
plt.show()
```



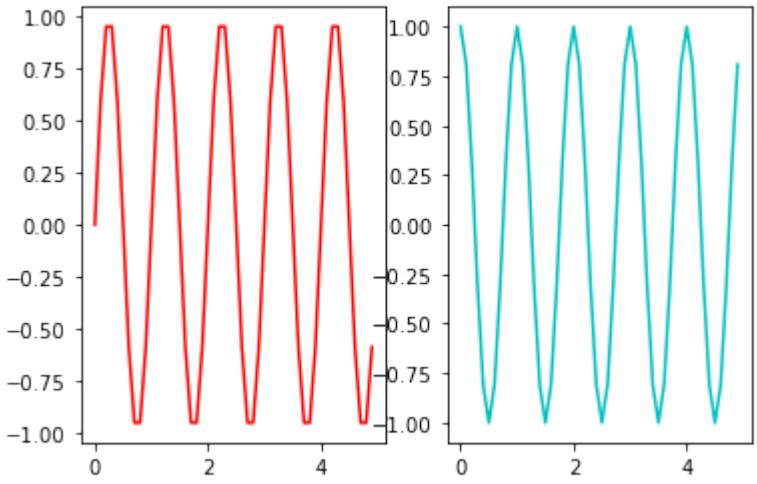
In [3]:

```
t1=np.arange(0.0,5.0,0.1)
y1=np.sin(2*np.pi*t1)
y2=np.cos(2*np.pi*t1)
plt.figure()
plt.subplot(211)
plt.plot(t1,y1,'r')
plt.subplot(212)
plt.plot(t1,y2,'c')
plt.show()
```



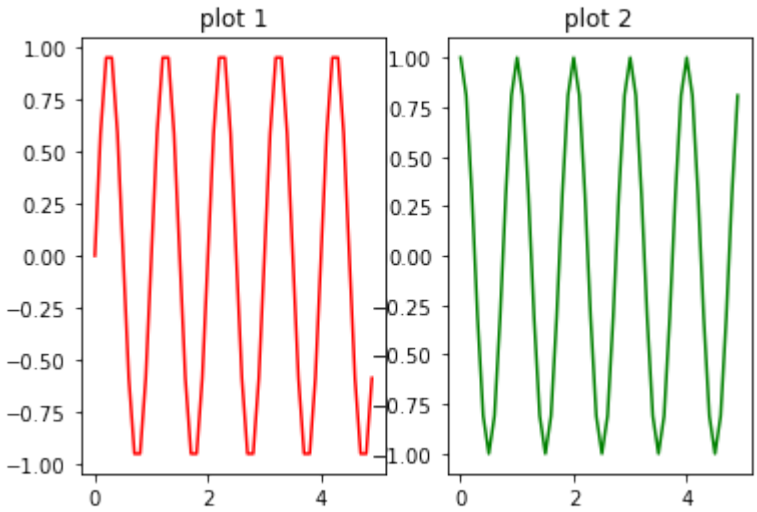
In [4]:

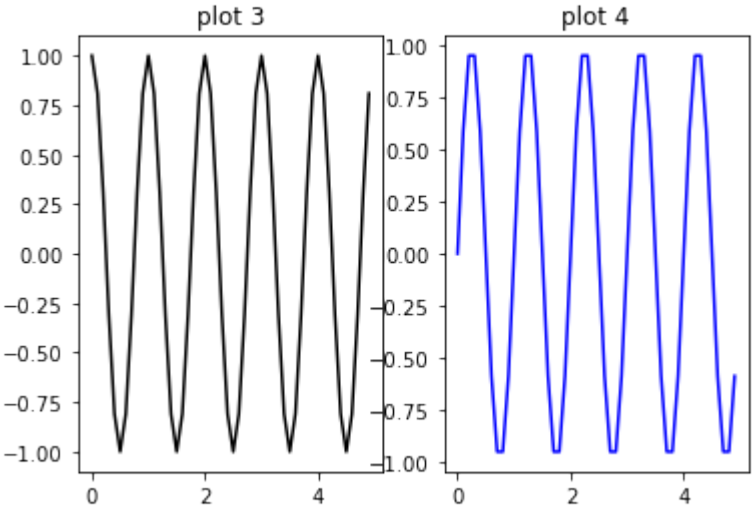
```
t1=np.arange(0.0,5.0,0.1)
y1=np.sin(2*np.pi*t1)
y2=np.cos(2*np.pi*t1)
plt.figure()
plt.subplot(121)
plt.plot(t1,y1,'r')
plt.subplot(122)
plt.plot(t1,y2,'c')
plt.show()
```



In [5]:

```
t1=np.arange(0.0,5.0,0.1)
y1=np.sin(2*np.pi*t1)
y2=np.cos(2*np.pi*t1)
plt.figure(1)
plt.subplot(121)
plt.title("plot 1")
plt.plot(t1,y1,'r')
plt.subplot(122)
plt.title("plot 2")
plt.plot(t1,y2,'g')

plt.figure(2)
plt.subplot(121)
plt.title("plot 3")
plt.plot(t1,y2,'k')
plt.subplot(122)
plt.title("plot 4")
plt.plot(t1,y1,'b')
plt.show()
```

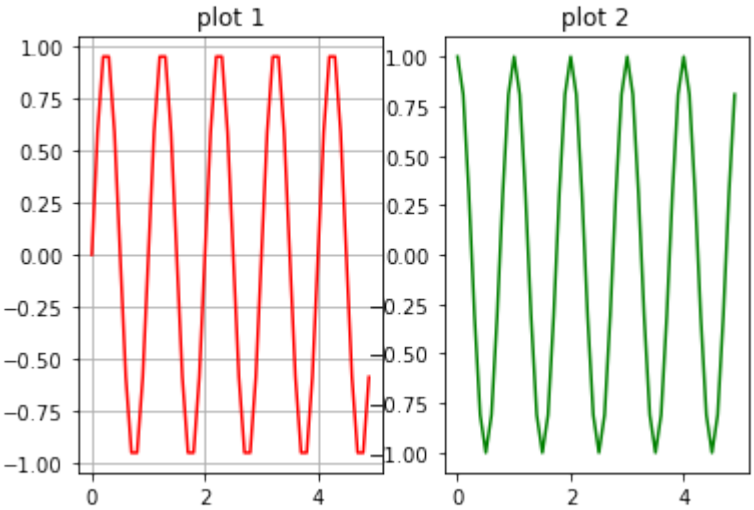


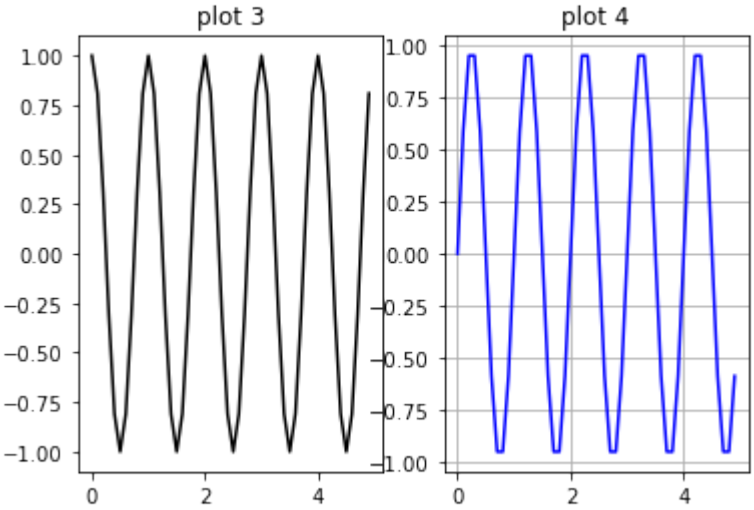


USING GRID

In [2]:

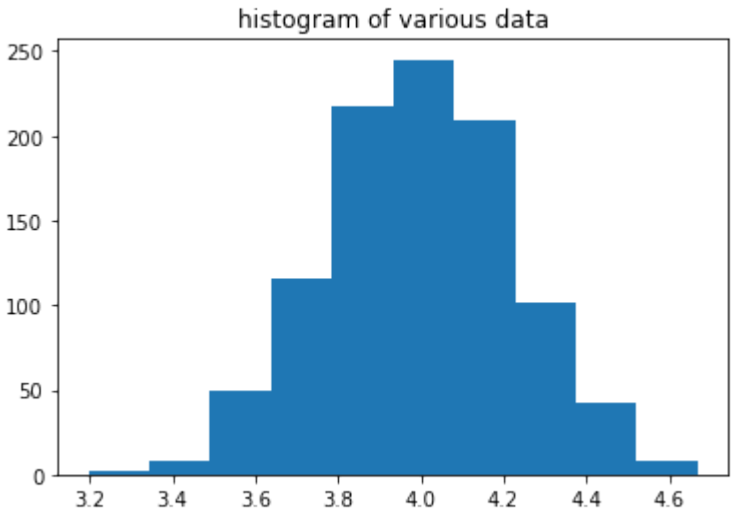
```
t1=np.arange(0.0,5.0,0.1)
y1=np.sin(2*np.pi*t1)
y2=np.cos(2*np.pi*t1)
plt.figure(1)
plt.subplot(121)
plt.title("plot 1")
plt.plot(t1,y1,'r')
plt.grid(True)
plt.subplot(122)
plt.title("plot 2")
plt.plot(t1,y2,'g')

plt.figure(2)
plt.subplot(121)
plt.title("plot 3")
plt.plot(t1,y2,'k')
plt.subplot(122)
plt.title("plot 4")
plt.plot(t1,y1,'b')
plt.grid(True)
plt.show()
```



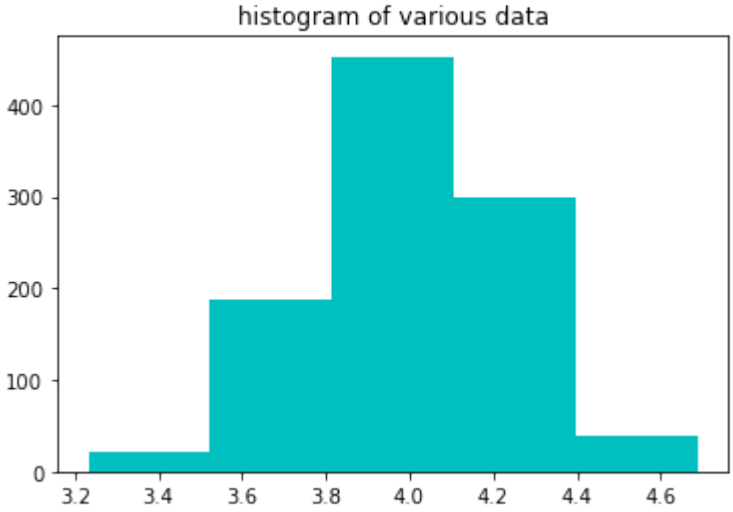


HISTOGRAM PLOT

In [3]:
```
import matplotlib.pyplot as plt
import numpy as np
data=np.random.randn(1000)
h1 =0.23*data+4
plt.hist(h1)
plt.title("histogram of various data",fontsize=12)
plt.show()
```

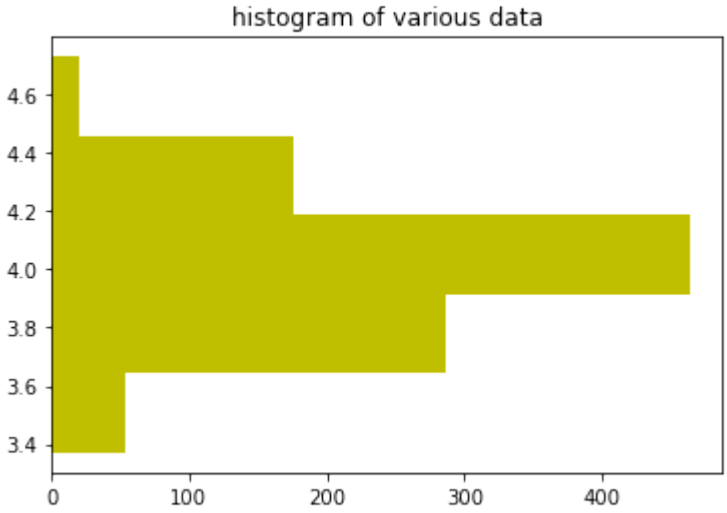


In [4]:
```
data=np.random.randn(1000)
h1 =0.23*data+4
plt.hist(h1,5,align="mid",color='c')
plt.title("histogram of various data",fontsize=12)
plt.show()
```



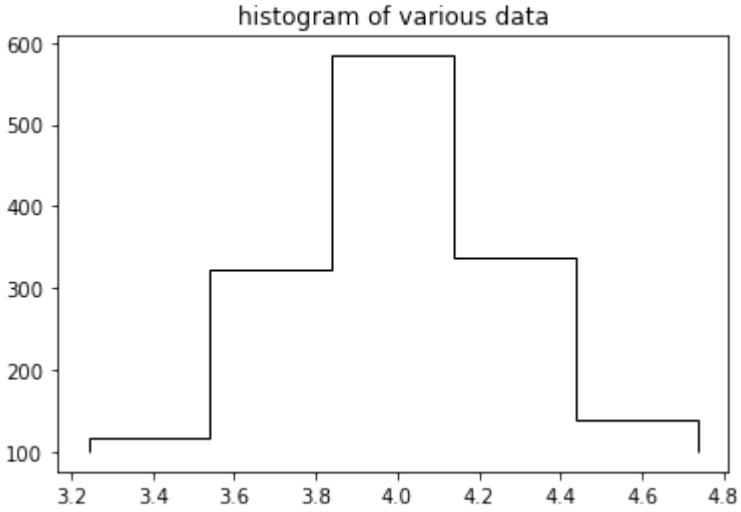
In [6]:

```
data=np.random.randn(1000)
h1 =0.23*data+4
plt.hist(h1,5,align="mid",color='y',orientation="horizontal")
plt.title("histogram of various data",fontsize=12)
plt.show()
```



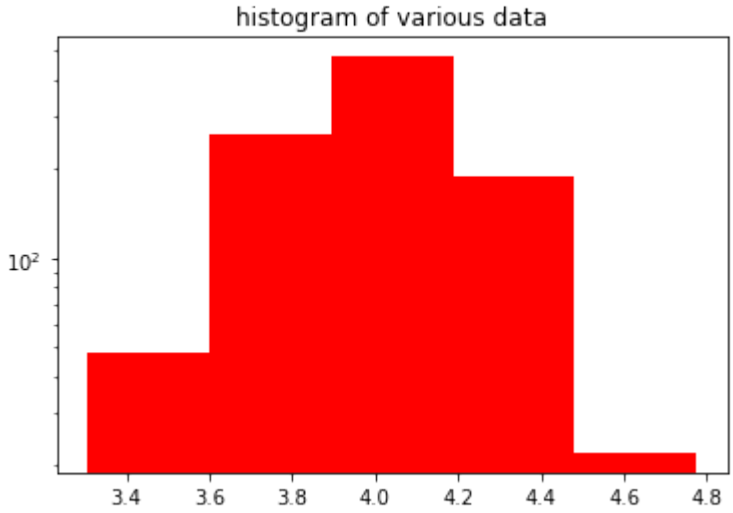
In [8]:

```
data=np.random.randn(1000)
h1 =0.23*data+4
plt.hist(h1,5,align="mid",color='k',histtype="step",bottom=100)
plt.title("histogram of various data",fontsize=12)
plt.show()
```



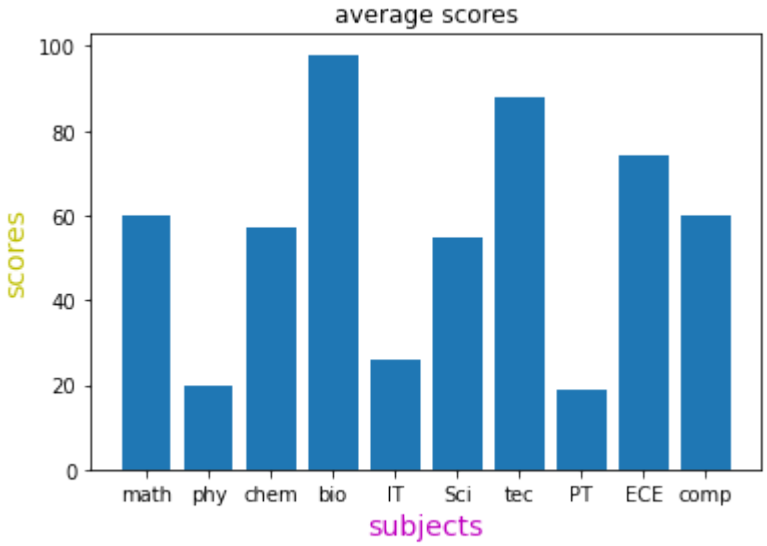
In [9]:

```
data=np.random.randn(1000)
h1 =0.23*data+4
plt.hist(h1,5,align="mid",color='r',histtype="bar",log=True)
plt.title("histogram of various data",fontsize=12)
plt.show()
```



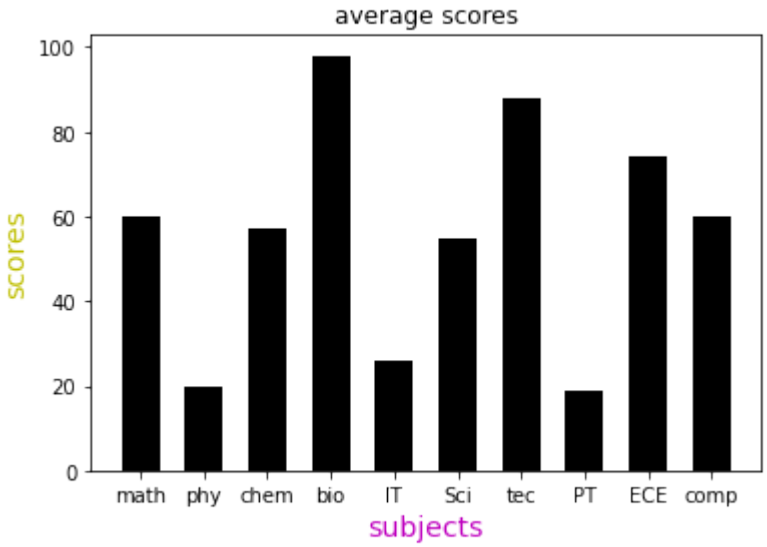
In [12]:

```
import matplotlib.pyplot as plt
import numpy as np
avg_score=[60,20,57,98,26,55,88,19,74,60]
sub=['math','phy','chem','bio','IT','Sci','tec','PT','ECE','comp']
plt.bar(sub,avg_score)
plt.xlabel("subjects",fontsize=14,color='m')
plt.ylabel("scores",fontsize=14,color='y')
plt.title("average scores")
plt.show()
```



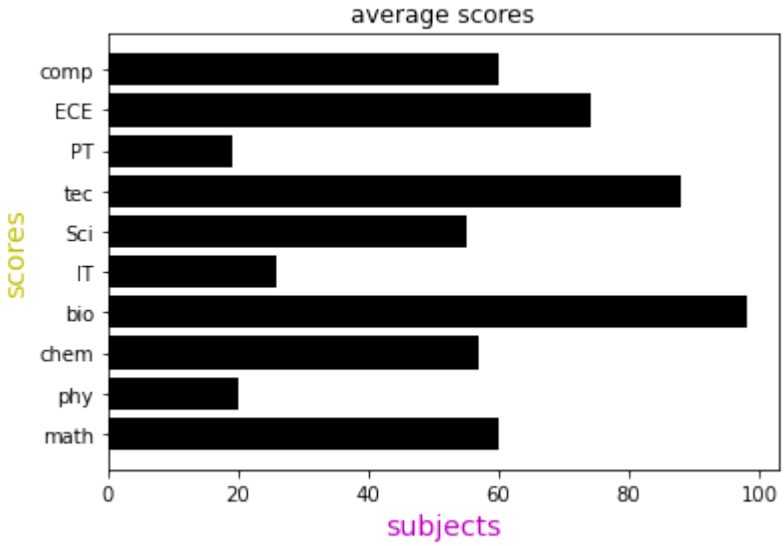
In [13]:

```
avg_score=[60,20,57,98,26,55,88,19,74,60]
sub=['math','phy','chem','bio','IT','Sci','tec','PT','ECE','comp']
plt.bar(sub,avg_score,width=0.6,color='k')
plt.xlabel("subjects",fontsize=14,color='m')
plt.ylabel("scores",fontsize=14,color='y')
plt.title("average scores")
plt.show()
```



In [15]:

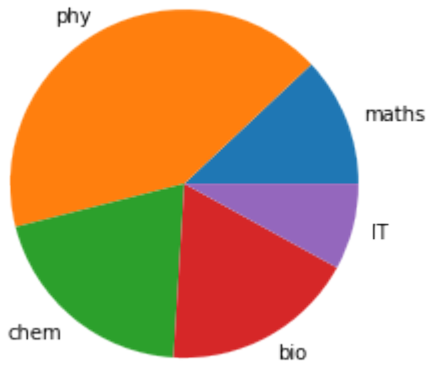
```
avg_score=[60,20,57,98,26,55,88,19,74,60]
sub=['math','phy','chem','bio','IT','Sci','tec','PT','ECE','comp']
plt.barh(sub,avg_score,color='k')
plt.xlabel("subjects",fontsize=14,color='m')
plt.ylabel("scores",fontsize=14,color='y')
plt.title("average scores")
plt.show()
```



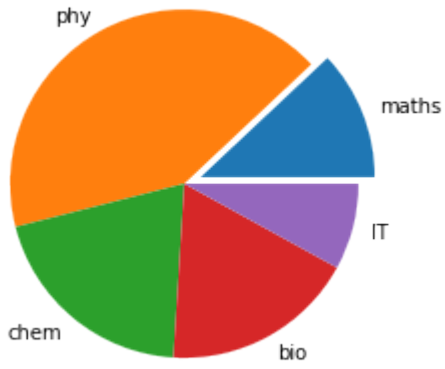
PIE PLOT

In [3]:
```
import matplotlib.pyplot as plt
import numpy as np
```

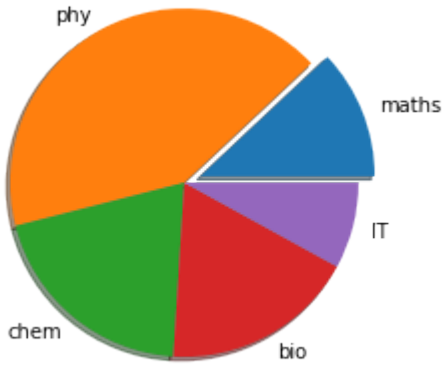
In [18]:
```
percent_res=[12,42,20,18,8]
sub=['maths','phy','chem','bio','IT']
plt.pie(percent_res,labels=sub)
plt.show()
```



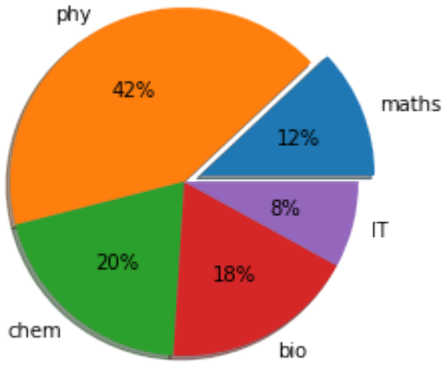
In [19]:
```
percent_res=[12,42,20,18,8]
sub=['maths','phy','chem','bio','IT']
plt.pie(percent_res,labels=sub,explode=(0.1,0,0,0,0))
plt.show()
```



In [20]:
```
percent_res=[12,42,20,18,8]
sub=['maths','phy','chem','bio','IT']
plt.pie(percent_res,labels=sub,explode=(0.1,0,0,0,0),shadow=True)
plt.show()
```



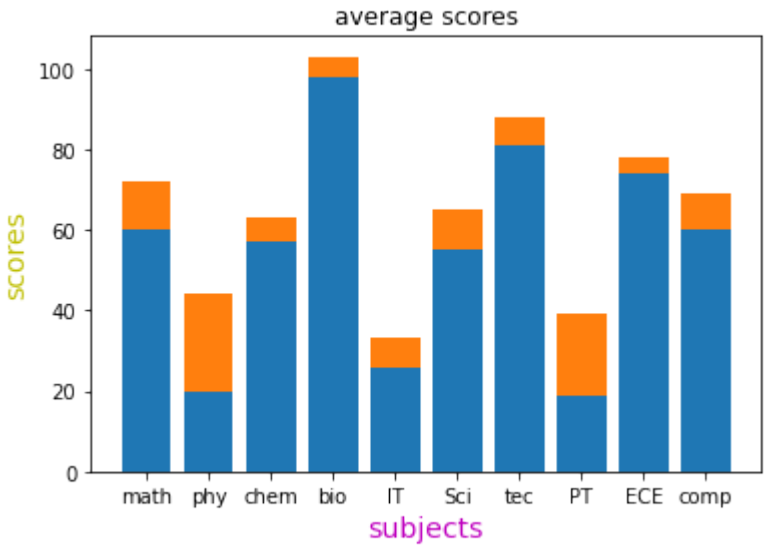
In [21]:
```
percent_res=[12,42,20,18,8]
sub=['maths','phy','chem','bio','IT']
plt.pie(percent_res,labels=sub,explode=(0.1,0,0,0,0),shadow=True,autopct='%1.0f%%')
plt.show()
```



STACKED BAR PLOT

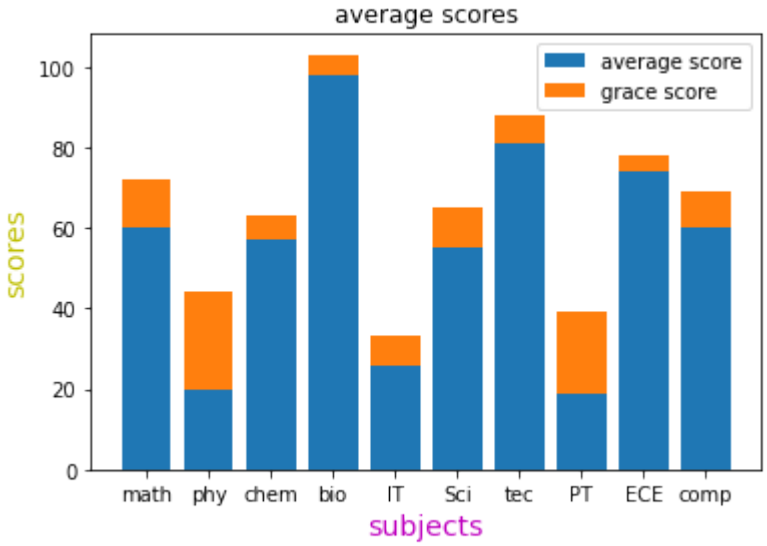
In [23]:
```
avg_score=[60,20,57,98,26,55,88,19,74,60]
sub=['math','phy','chem','bio','IT','Sci','tec','PT','ECE','comp']
grace=[12,24,6,5,7,10,-7,20,4,9]
```

```
plt.xlabel("subjects",fontsize=14,color='m')
plt.ylabel("scores",fontsize=14,color='y')
plt.title("average scores")
plt.bar(sub,avg_score)
plt.bar(sub,grace,bottom=avg_score)
plt.show()
```



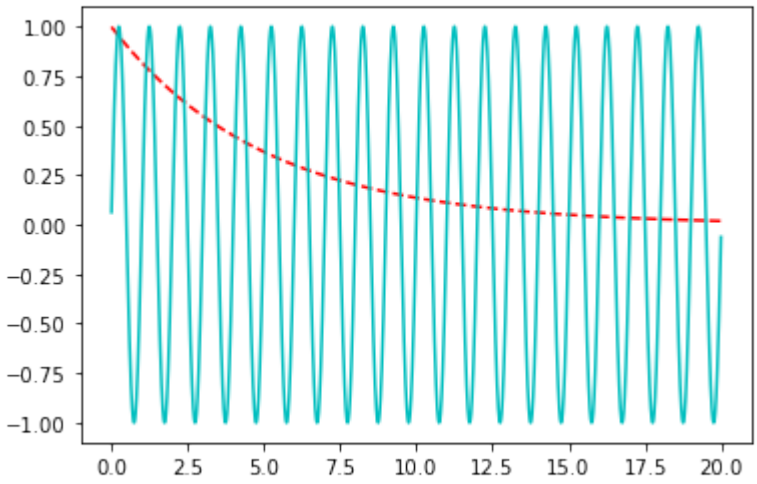
In [25]:

```
avg_score=[60,20,57,98,26,55,88,19,74,60]
sub=['math','phy','chem','bio','IT','Sci','tec','PT','ECE','comp']
grace=[12,24,6,5,7,10,-7,20,4,9]
plt.xlabel("subjects",fontsize=14,color='m')
plt.ylabel("scores",fontsize=14,color='y')
plt.title("average scores")
plt.bar(sub,avg_score,label='average score')
plt.bar(sub,grace,bottom=avg_score,label='grace score')
plt.legend(loc='best')
plt.show()
```

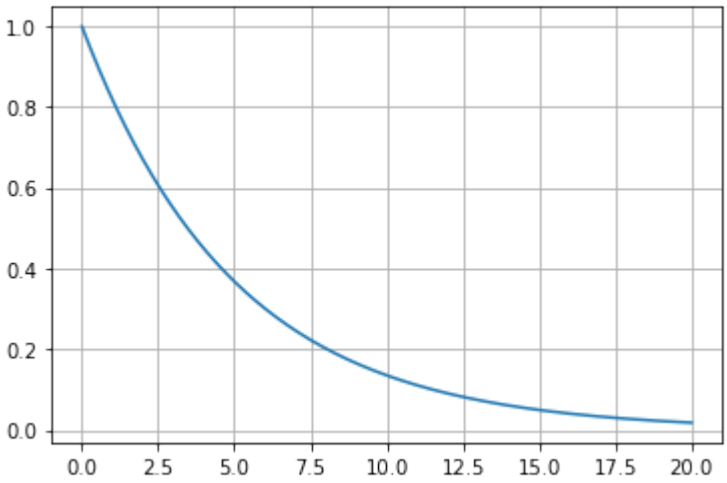


In [27]:

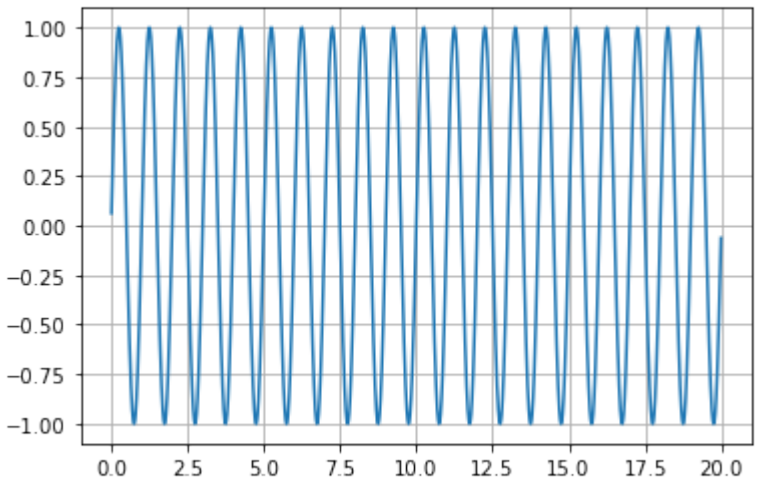
```
import matplotlib.pyplot as plt
import numpy as np
t=np.arange(0.01,20.0,0.01)
y1=np.exp(-t/5.0)
y2=np.sin(2*np.pi*t)
plt.plot(t,y1,'--r',t,y2,'-c')
plt.show()
```



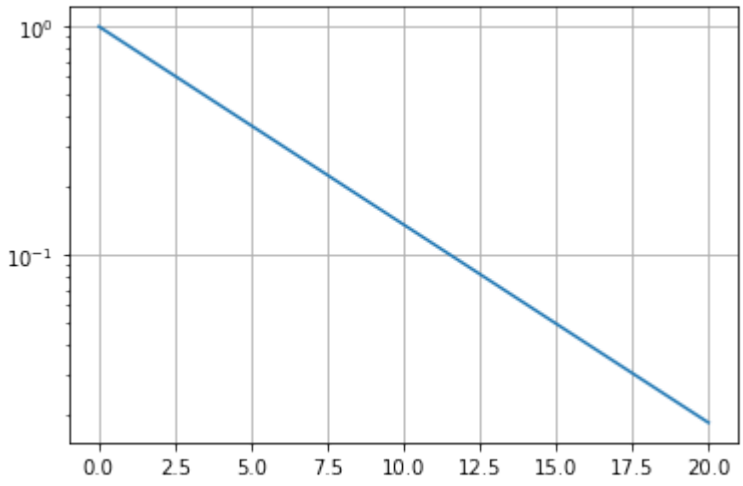
In [28]:
```
plt.plot(t,y1)
plt.grid(True)
plt.show()
```



In [29]:
```
plt.plot(t,y2)
plt.grid(True)
plt.show()
```

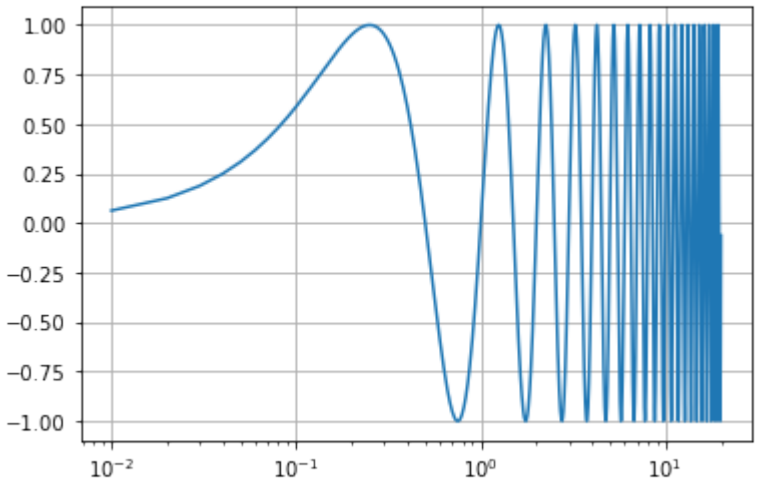


In [30]:
```
plt.semilogy(t,y1)
plt.grid(True)
plt.show()
```



In [31]:

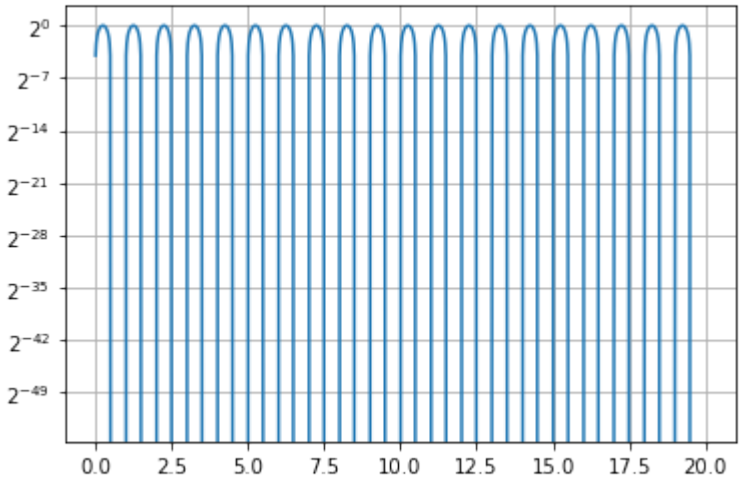
```
plt.semilogx(t,y2)
plt.grid(True)
plt.show()
```



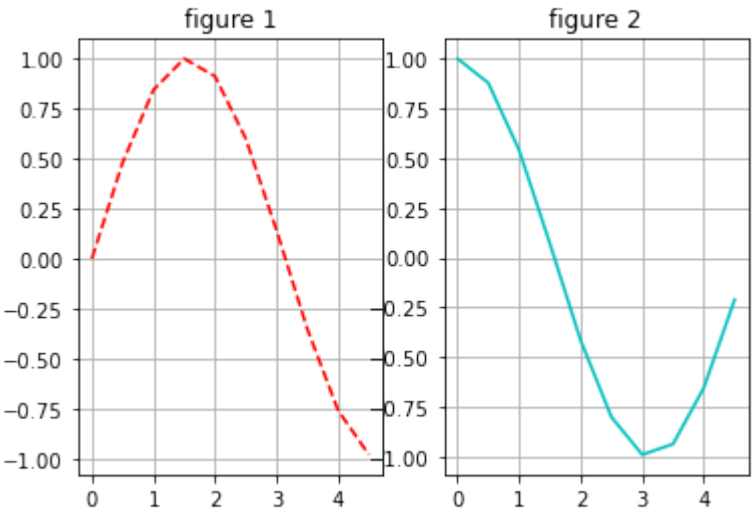
In [34]:

```
plt.semilogy(t,y2,basey=2)
plt.grid(True)
plt.show()
```

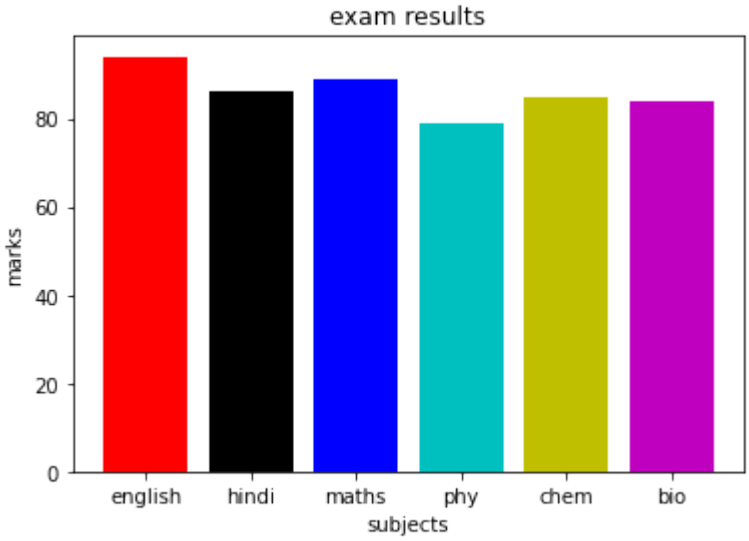
```
C:\Users\NIDHIV~1\AppData\Local\Temp/ipykernel_15424/1114514963.py:1: MatplotlibDeprecationWarning: The 'basey' parameter of __init__() has been renamed 'base' since Matplotlib 3.3; support for the old name will be dropped two minor releases later.
  plt.semilogy(t,y2,basey=2)
```



In [35]:
```
import matplotlib.pyplot as plt
import numpy as np
t=np.arange(0,5,0.5)
x=np.sin(t)
y=np.cos(t)
plt.figure()
plt.subplot(121)
plt.title("figure 1")
plt.plot(t,x,'--r')
plt.grid(True)
plt.subplot(122)
plt.title("figure 2")
plt.plot(t,y,'-c')
plt.grid(True)
plt.show()
```



In [37]:
```
import matplotlib.pyplot as plt
import numpy as np
marks=[94,86,89,79,85,84]
sub=['english','hindi','maths','phy','chem','bio']
colors=['r','k','b','c','y','m']
plt.xlabel("subjects")
plt.ylabel("marks")
plt.title("exam results")
plt.bar(sub,marks,color=colors)
plt.show()
```


exam results
marks
0
20
40
60
80
english
hindi
maths
phy
chem
bio
subjects