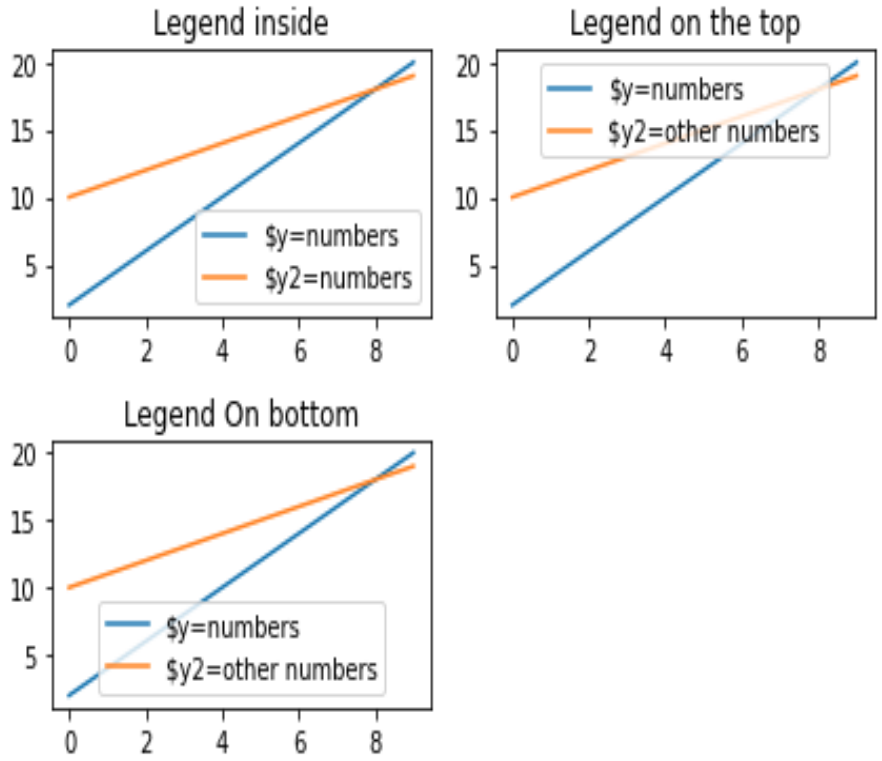
PROGRAM 4.5.1:

```
#AMIT CHAUHAN
#RA2311004010332

import matplotlib.pyplot as plt
import numpy as np
y = [2,4,6,8,10,12,14,16,18,20]
y2 = [10,11,12,13,14,15,16,17,18,19]
x = np.arange(10)
fig = plt.figure()
ax1 = plt.subplot(2,2,1)
ax1.plot(x, y, label='$y=numbers')
ax1.plot(x, y2, label='$y2=numbers')
plt.title('Legend inside')
ax1.legend()
ax2 = plt.subplot(2,2,2)
ax2.plot(x, y, label='$y=numbers')
ax2.plot(x, y2, label='$y2=other numbers')
ax2.legend(loc='upper center')
plt.title('Legend on the top')
ax3 = plt.subplot(2,2,3)
ax3.plot(x, y, label='$y=numbers')
ax3.plot(x, y2, label='$y2=other numbers')
plt.title('Legend On bottom')
ax3.legend(loc='lower center')
plt.tight_layout()
plt.show()
```

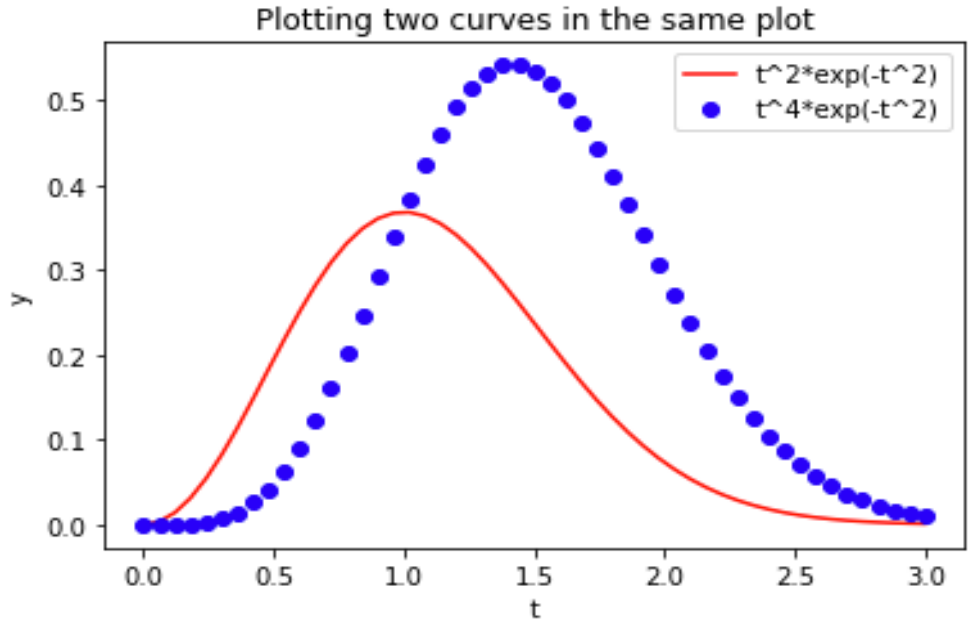


PROGRAM 4.5.2:

```
#AMIT CHAUHAN
#RA2311004010332

def f1(t):
    return t**2*np.exp(-t**2)
def f2(t):
    return t**2*f1(t)

t = np.linspace(0, 3, 51)
y1 = f1(t)
y2 = f2(t)
plt.plot(t, y1,"-r")
plt.plot(t, y2, "bo")
plt.xlabel("t")
plt.ylabel("y")
plt.legend(["t^2*exp(-t^2)", "t^4*exp(-t^2)"])
plt.title("Plotting two curves in the same plot")
plt.savefig("tmp3.pdf")
plt.show()
```



PROGRAM 4.5.3:

```
#AMIT CHAUHAN
#RA2311004010332

import matplotlib.pyplot as plt
import numpy as np

x=np.linspace(0,10,100)
for i in range(len(x)):
    y=np.sin(x)
    z=np.cos(x)
plt.plot(x,y,'ro-')
plt.plot(x,z,'g*-')
plt.xlabel("t")
plt.ylabel("y")
plt.title("Sine & Cosine Waveforms")
plt.legend(["Sine wave", "Cosine wave"])

plt.savefig("tmp4.pdf")
plt.show()
```