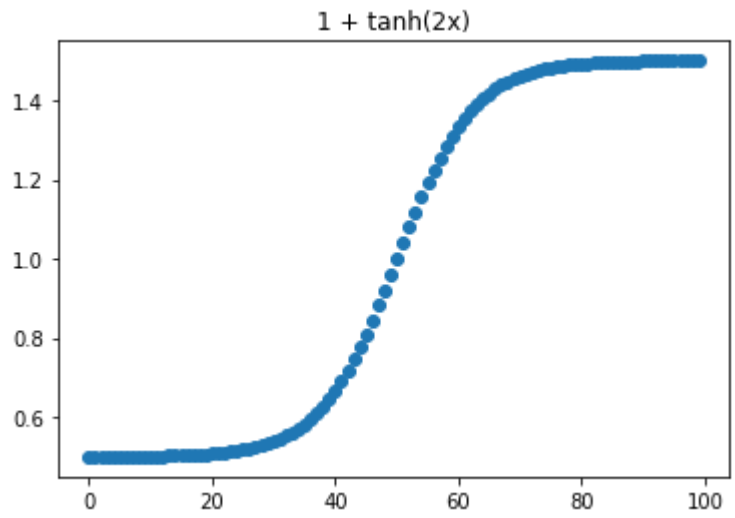
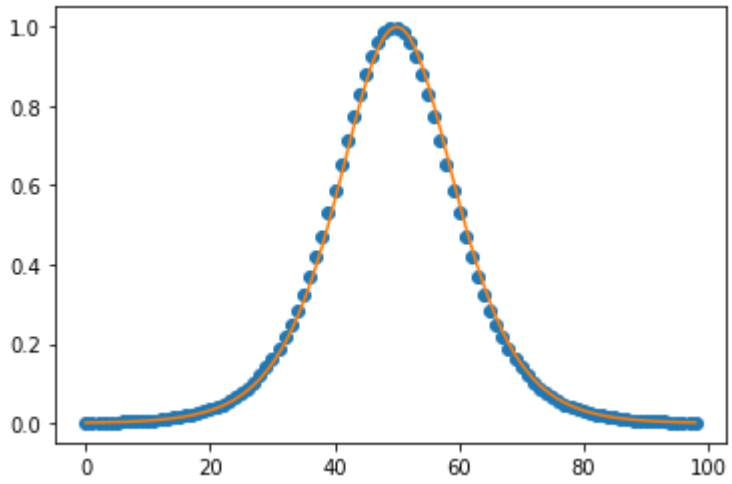
```
import math
from pylab import plot, show,title
a=-2
b=2
n=100
h=(b-a)/n
d=[]
x = []
da = []

def funcion(x):
  fx=1+((0.5)*math.tanh(2*x))
  return fx
def analitica(x):
  an=1-(math.tanh(2*x)**2)
  return an

for i in range(n):
  d.append(funcion(a+i*h))
  x.append(a+(i*h))
  da.append(analitica(a+(i*h)))

title("1 + tanh(2x)")
plot(d,"o")
show()
```




```
from pylab import plot, show
#derivada numerica hacia adelante (ejercicio 5.16)
d1=[]
d2=[]
for i in range(n-1):
  d1.append((d[i+1]-d[i])/h)
  d2.append(analitica(a+i*h))
#comparacion grafica entre la derivada analitica y la derivada mumerica
plot(d1,"o")
```

```
plot(d2)
show()
```




```
from pylab import plot, show
#derivada numerica en el metodo de diferencia central
Der1=[]
der2=[]
for p in range(1,n):
  Der1.append((funcion(a+(p+1)*h)-funcion(a+(p-1)*h))/(2*h))
  der2.append(a+p*h)

#comparacion grafica entre la derivada analitica y la derivada mumerica
title("derivada analitica y metodo de la diferencia central")
plot(der2, Der1, ".r")
plot(x, da)
show()
```