Day 17

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

In [2]:
```
def integrate(func, a, b, steps):
    # using trapezoid method
    h = (b-a)/steps
    s = (func(a)+func(b))*h/2
    x = np.linspace(a, b, steps+1)
    y = func(x)
    s = s + np.sum(y[1:steps]*h)
    return(s)

def integrate1(func, a, b, steps):
    if steps%2 != 0:
        steps = steps + 1
    h = (b-a)/steps
    x = np.linspace(a, b, steps+1)
    y = func(x)
    s = h/3*(y[0] + y[-1] + 4*np.sum(y[1:steps:2]) +
             2*np.sum(y[2:steps-1:2]))
    return(s)
```

In [3]:
```
def f(x):
    return(x**4-2*x+1)
```

In [4]:
```
integrate1(f, 0, 2, 101)
```

Out[4]:
```
4.400000039417404
```

In [5]:
```
def f1(t):
    return(np.exp(-(t**2)))

def capitalE(x):
    return(integrate1(f1,0,x,100))
```

In [6]:
```
fig0, ax0 = plt.subplots()

x = np.linspace(0, 3, 31)
y = capitalE(x)

ax0.plot(x,f1(x), 'o', label=r'f1(t)')
#ax0.plot(x,y, 'o', label=r'$\int f1(t) dt$')
```

Out[6]:
```
[<matplotlib.lines.Line2D at 0x7f1ef77d4160>]
```

In [7]:
```
capitalE(3.3)
```

Out[7]:
```
0.8862242155976702
```

In [8]:
```
y[30]
```

Out[8]:
```
56.85737714997254
```

In [9]:
```
x
```

Out[9]:
```
array([0. , 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1. , 1.1, 1.2,
       1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2. , 2.1, 2.2, 2.3, 2.4, 2.5,
       2.6, 2.7, 2.8, 2.9, 3. ])
```

In [10]:
```
capitalE(x)
```

Out[10]:
```
array([ 0.        ,  1.89557588,  3.79113225,  5.68665152,  7.58211965,
        9.47752732, 11.37287054, 13.26815051, 15.16337302, 17.05854735,
       18.9536849 , 20.84879789, 22.74389808, 24.63899581, 26.53409943,
       28.42921495, 30.32434611, 32.21949462, 34.11466053, 36.00984274,
       37.90503938, 39.80024823, 41.69546699, 43.59069352, 45.48592594,
       47.38116268, 49.27640251, 51.17164447, 53.06688786, 54.9621322 ,
       56.85737715])
```

In [ ]:
```

```