Solución Lab 7
FISI 6510

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Exercise 5.1: In the on-line resources you will find a file called `velocities.txt`, which contains two columns of numbers, the first representing time t in seconds and the second the x-velocity in meters per second of a particle, measured once every second from time $t = 0$ to $t = 100$. The first few lines look like this:

```
0       0
1       0.069478
2       0.137694
3       0.204332
4       0.269083
5       0.331656
```

Write a program to do the following:

a) Read in the data and, using the trapezoidal rule, calculate from them the approximate distance traveled by the particle in the x direction as a function of time. See Section 2.4.3 on page 57 if you want a reminder of how to read data from a file.

b) Extend your program to make a graph that shows, on the same plot, both the original velocity curve and the distance traveled as a function of time.

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

a)

[2]:
```
data=np.loadtxt("velocities.txt")
t=data[:,0]
vx=data[:,1]
```

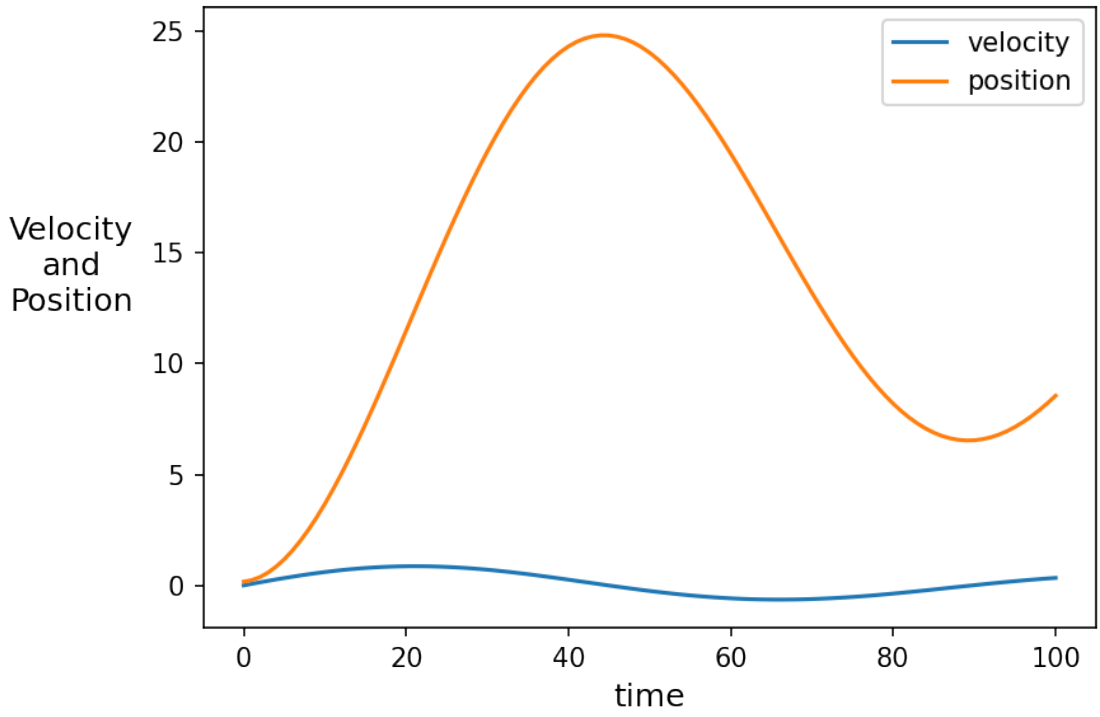
[3]:
```
def f(x):
    return vx[x]

N = len(vx)
a = 0
b = 100
h = 1
```

```
pos=[]
s = 0.5*f(a) + 0.5*f(b)
pos.append(h*s)
for k in range(1,N):
    s += f(a+k*h)
    pos.append(h*s)
```

b)

[4]:
```
plt.figure(dpi=150)
plt.plot(t,vx,label='velocity')
plt.plot(t,pos,label='position')
plt.xlabel("time",size=12)
plt.ylabel("Velocity\nand\nPosition",size=12,labelpad=30,rotation=0)
plt.tight_layout()
plt.legend()
plt.show()
```



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