

Initialization Variable

```
import numpy as np
import matplotlib.pyplot as plt
```

```
Tinitial = 0
Tfinal = 10
delT = 0.1
```

```
arraySize = int ((Tfinal - Tinitial)/delT)
arraySize
```

100

```
x = np.zeros(int(arraySize))
y = np.zeros(int(arraySize))
theta = np.ones(int(arraySize))
x, y, theta
```

[illegible]

```
r = 0.1
l = 1
wl = np.ones(100)
wr = np.ones(100)
wl, wr
```

[illegible]

Condition

```
In [21]: for i in range(100):  
    wr[i] = 1  
    if i>=5 and i<=15:  
        wr[i] = 12  
    elif i>=20 and i<=40:  
        wr[i] = 12  
    elif i>=40 and i<=60:  
        wl[i] = 12  
    elif i>=60 and i<=80:  
        wl[i] = 12  
  
wl, wr
```

```
Out[21]: (array([ 1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  
    1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  
    1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  
    1.,  1., 12., 12., 12., 12., 12., 12., 12., 12., 12., 12., 12.,  
   12., 12., 12., 12., 12., 12., 12., 12., 12., 12., 12., 12., 12.,  
   12., 12., 12., 12., 12., 12., 12., 12., 12., 12., 12., 12., 12.,  
   12., 12., 12.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  
    1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.]),  
 array([ 1.,  1.,  1.,  1.,  1., 12., 12., 12., 12., 12., 12., 12., 12.,  
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    1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  
    1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.,  1.])))
```

Main Program

```
In [22]: for i in range(99):
          x[i+1] = x[i] + ((r/2) * (wl[i]+wr[i])*(np.cos(theta[i]))) * delT
          y[i+1] = y[i] + ((r/2) * (wl[i]+wr[i])*(np.sin(theta[i]))) * delT
          theta[i+1] = theta[i] + ((r/l) * (wr[i]-wl[i]))* delT

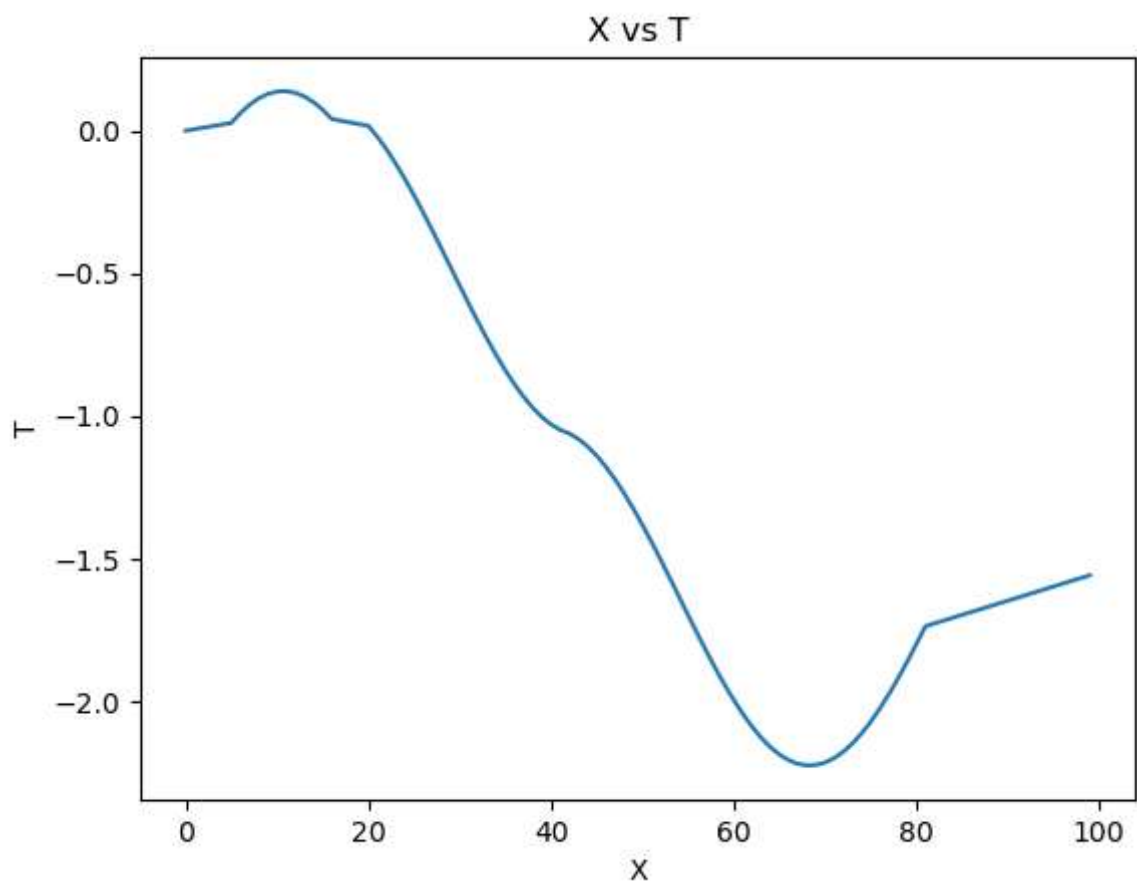
          x, y, theta
```

```
Out[22]: (array([ 0.          ,  0.00540302,  0.01080605,  0.01620907,  0.02161209,
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 98.8, 98.9, 99.0, 99.1, 99.2, 99.3, 99.4, 99.5, 99.6, 99.7, 99.8,
 99.9, 100.0]))
```

```
In [23]: t= np.arange(100)

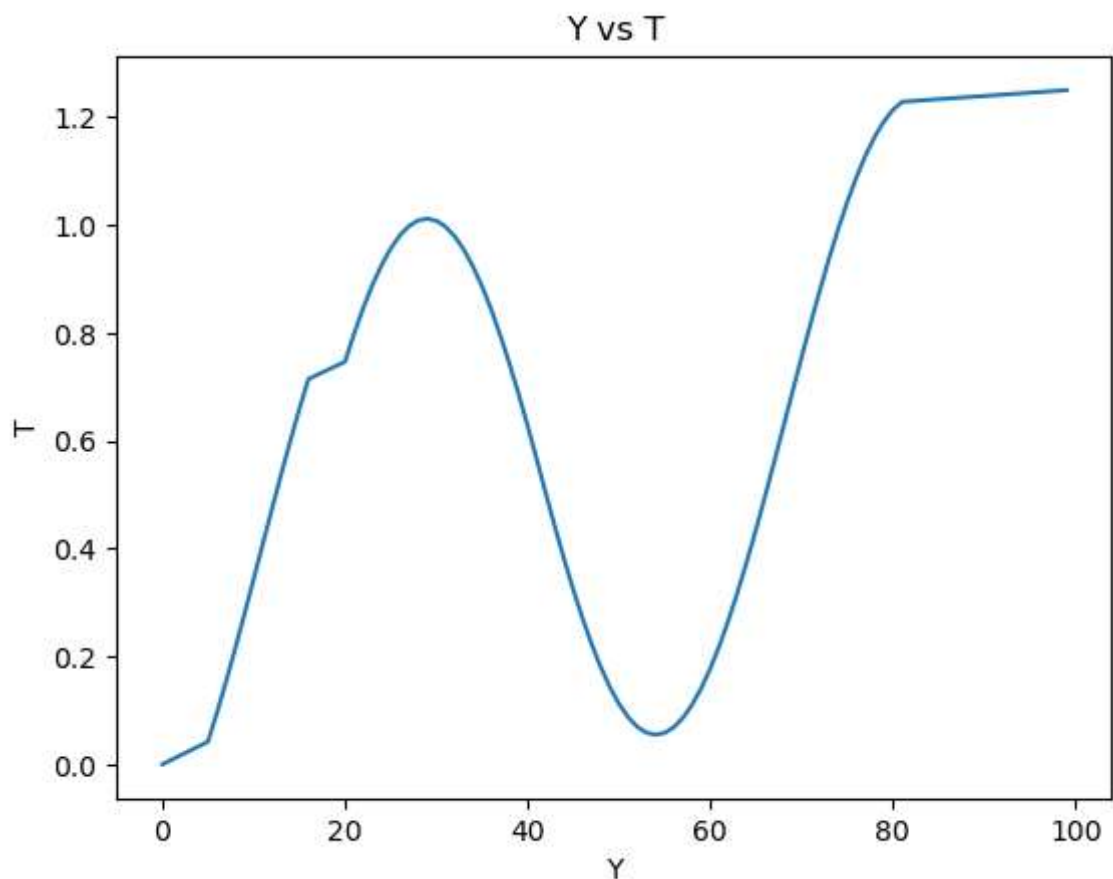
plt.plot(t, x)
plt.title('X vs T')
plt.xlabel('X')
plt.ylabel('T')
```

```
Out[23]: Text(0, 0.5, 'T')
```



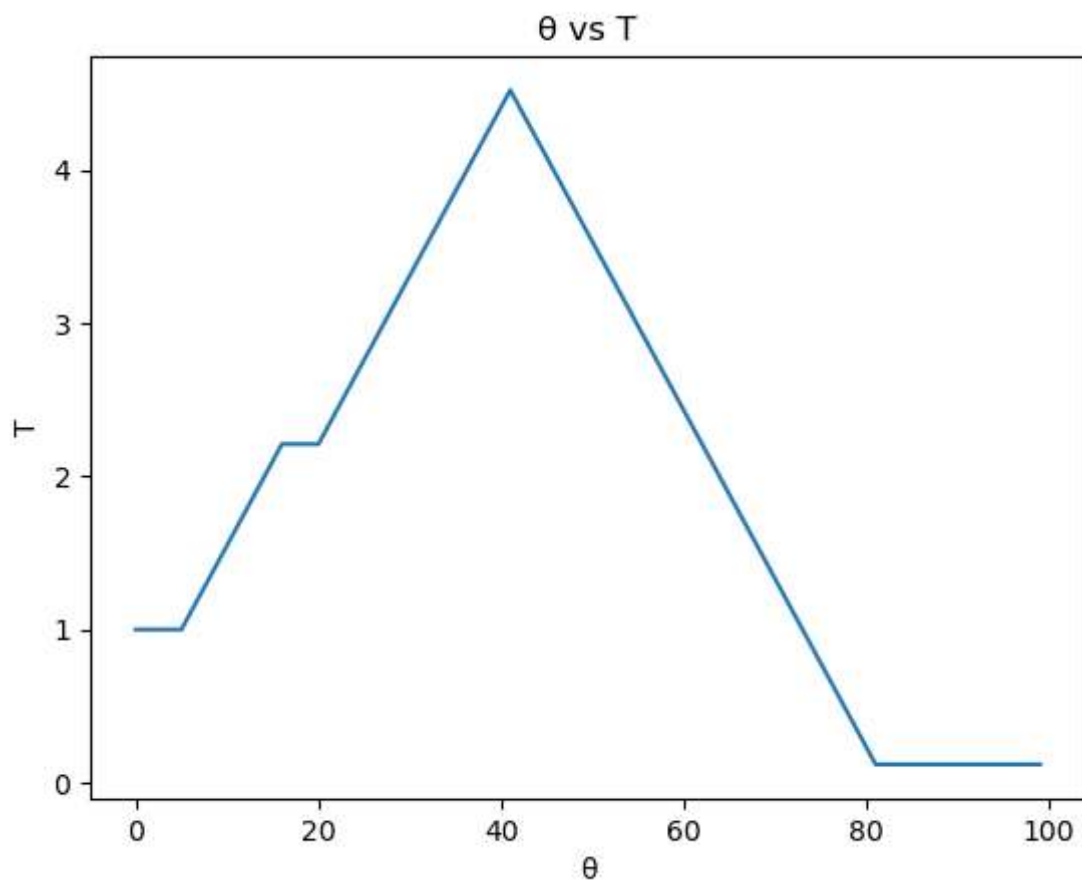
```
In [24]: plt.plot(t, y)
plt.title('Y vs T')
plt.xlabel('Y')
plt.ylabel('T')
```

Out[24]: Text(0, 0.5, 'T')



```
In [25]: plt.plot(t, theta)
plt.title('θ vs T')
plt.xlabel('θ')
plt.ylabel('T')
```

```
Out[25]: Text(0, 0.5, 'T')
```



```
In [26]: plt.plot(x,y)
plt.title('X vs Y')
plt.xlabel('X')
plt.ylabel('Y')
```

```
Out[26]: Text(0, 0.5, 'Y')
```

