#NUMERICAL INTEGRATION USING TRAPEZOIDAL RULE

```python
import numpy as np
n=int(input("enter the value of data point ="))
x=np.zeros(n)
y=np.zeros((n,n))
for i in range(n):
    x[i]=float(input("enter the value x["+str(i)+"]="))
    y[i][0]=float(input("enter the value y["+str(i)+"]="))
for i in range(1,n):
    for j in range(0,n-i):
        y[j][i]=y[j+1][i-1]-y[j][i-1]
print("x",end='\t')
print("y",end='\t')
for i in range(1,n):
    print("d"+str(i)+"y",end='\t')
print("\n")

for i in range(0,n):
    print(x[i],end='\t')
    for j in range(0,n-i):
        print(y[i][j],end='\t')
    print("\n")
h=x[1]-x[0]
s=y[0][0]+y[n-1][0]
for i in range(1,n-1):
    s+=2*y[i][0]
val=(s*h)/2
print("value of integration is=",val)
```

#Output

```
'''enter the value of data point =7
enter the value x[0]=-4
enter the value y[0]=0
enter the value x[1]=-3
enter the value y[1]=4
enter the value x[2]=-2
enter the value y[2]=5
enter the value x[3]=-1
enter the value y[3]=3
enter the value x[4]=0
enter the value y[4]=10
enter the value x[5]=1
enter the value y[5]=11
enter the value x[6]=2
enter the value y[6]=2
x    y    d1y  d2y d3y d4y d5y d6y

-4.0 0.0  4.0  -3.0 0.0  12.0 -39.0    77.0

-3.0 4.0  1.0  -3.0 12.0 -27.0     38.0
```

```
-2.0 5.0  -2.0 9.0  -15.0    11.0

-1.0 3.0  7.0  -6.0 -4.0

0.0  10.0 1.0   -10.0

1.0  11.0 -9.0

2.0  2.0

value of integration is= 34.0'''
```