

```
In [47]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
df1=pd.read_csv("file1.csv")
df1=df1.dropna(axis=1)
df2=pd.read_csv("file2.csv")
df2=df2.dropna(axis=1)
df3=pd.read_csv("file3.csv")
df3=df3.dropna(axis=1)
display(df1,df2,df3)
```

	x	-2	-1.95	-1.9	-1.85	-1.8	-1.75	-1.7	-1.65	-1.6	...	2.55	2.6	2.65	2.7	2.75	2.8	2.85
0	0.00	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
1	0.01	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
2	0.02	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
3	0.03	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
4	0.04	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
96	0.96	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
97	0.97	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
98	0.98	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
99	0.99	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1
100	1.00	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1	1	1

101 rows × 102 columns

	x	-2	-1.99	-1.98	-1.97	-1.96	-1.95	-1.94	-1.93	-1.92	...	2.91	2.92	2.93	2.94	2.95
0	0.00	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
1	0.01	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
2	0.02	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
3	0.03	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
4	0.04	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
96	0.96	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
97	0.97	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
98	0.98	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
99	0.99	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1
100	1.00	0	0	0	0	0	0	0	0	0	...	1	1	1	1	1

101 rows × 502 columns

	x	-2	-1.995	-1.99	-1.985	-1.98	-1.975	-1.97	-1.965	-1.96	...	2.955	2.96	2.965	2.97
0	0.00	0	0	0	0	0	0	0	0	0	...	1	1	1	1
1	0.01	0	0	0	0	0	0	0	0	0	...	1	1	1	1
2	0.02	0	0	0	0	0	0	0	0	0	...	1	1	1	1
3	0.03	0	0	0	0	0	0	0	0	0	...	1	1	1	1
4	0.04	0	0	0	0	0	0	0	0	0	...	1	1	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
96	0.96	0	0	0	0	0	0	0	0	0	...	1	1	1	1
97	0.97	0	0	0	0	0	0	0	0	0	...	1	1	1	1
98	0.98	0	0	0	0	0	0	0	0	0	...	1	1	1	1
99	0.99	0	0	0	0	0	0	0	0	0	...	1	1	1	1
100	1.00	0	0	0	0	0	0	0	0	0	...	1	1	1	1

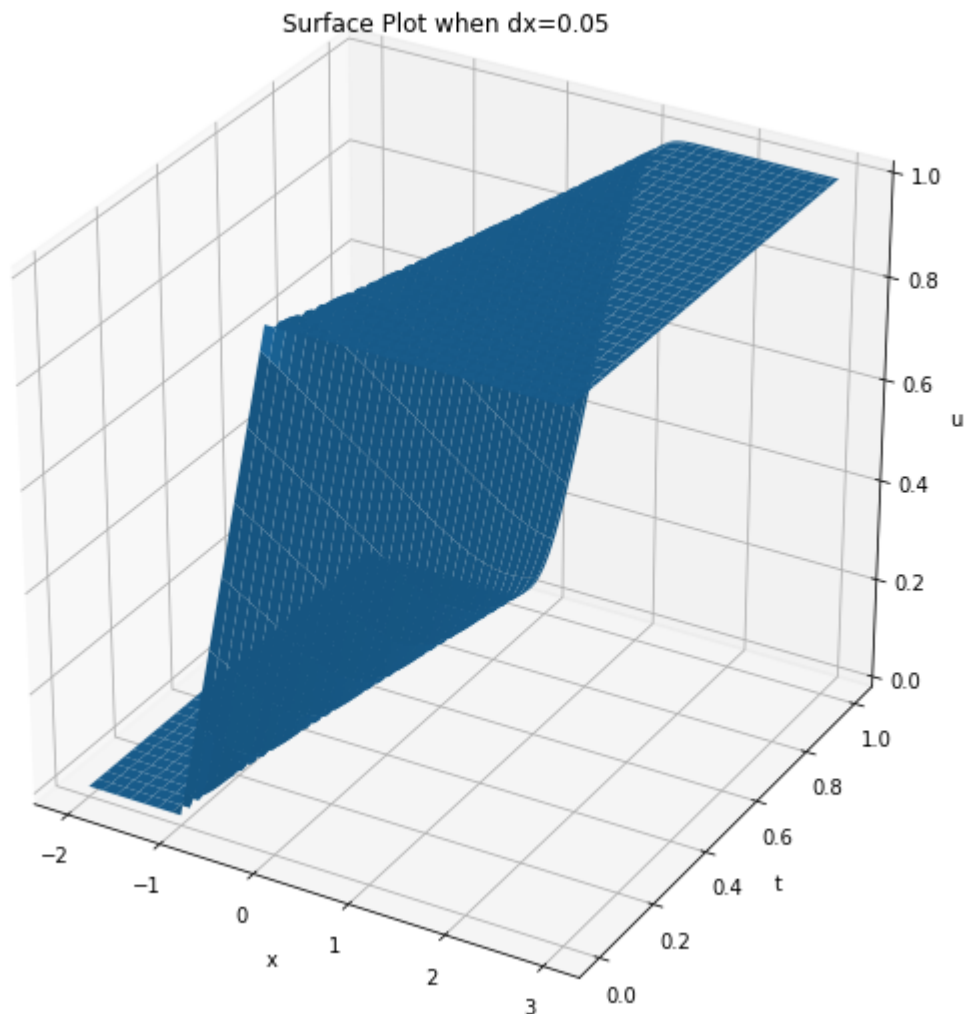
101 rows × 1002 columns

```

In [52]: x1 = np.asarray(df1.columns)
x1 = np.delete(x1,0).astype(float)
t1 = df1[['x']]
xx1, tt1 = np.meshgrid(x1, t1, sparse=True)
u1 = df1.drop(['x'], axis=1)
fig = plt.figure()
plt.gcf().set_size_inches(10, 10, 10)
surface1 = fig.add_subplot(111, projection='3d')
surface1.set_xlabel('x')
surface1.set_ylabel('t')
surface1.set_zlabel('u')
surface1.set_title('Surface Plot when dx=0.05')
surface1.plot_surface(xx1, tt1, u1)

```

Out[52]: <mpl\_toolkits.mplot3d.art3d.Poly3DCollection at 0x1f09cfb2288>

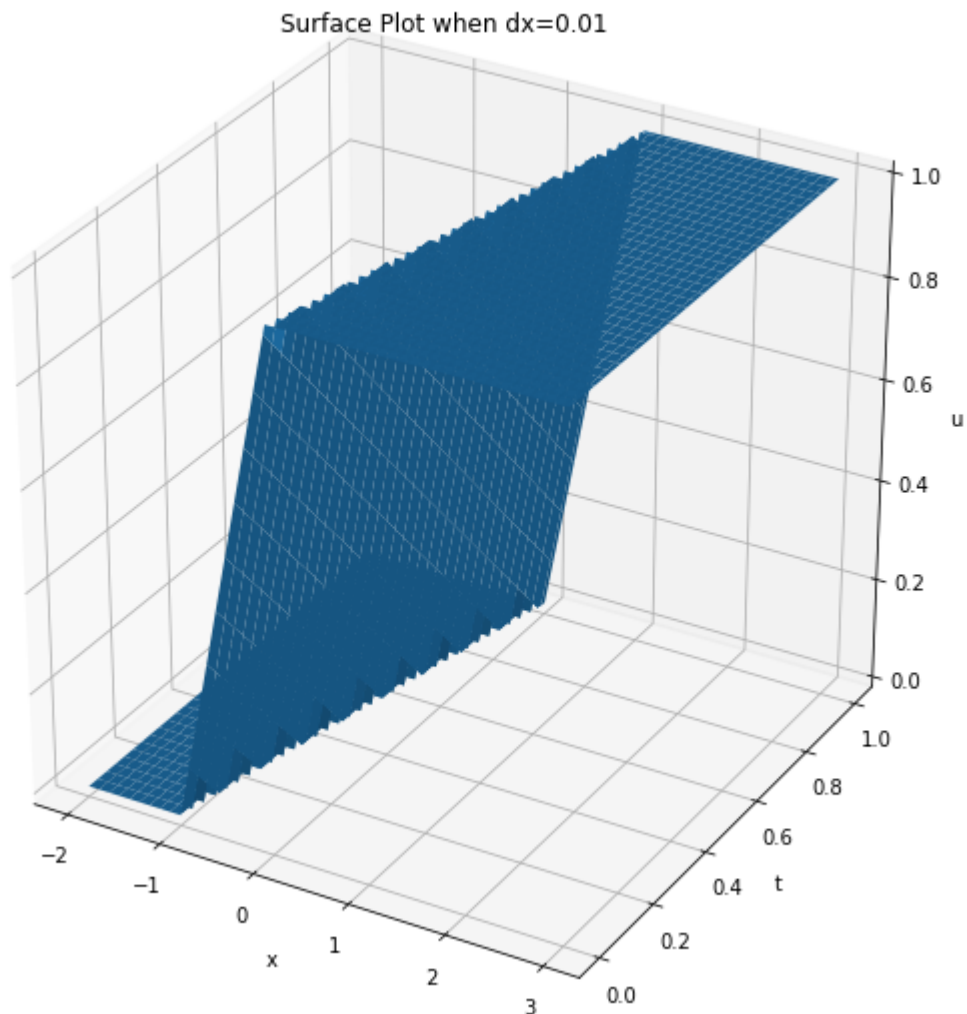


```

In [53]: x2 = np.asarray(df2.columns)
x2 = np.delete(x2,0).astype(float)
t2 = df2[['x']]
xx2, tt2 = np.meshgrid(x2, t2, sparse=True)
u2 = df2.drop(['x'], axis=1)
fig = plt.figure()
plt.gcf().set_size_inches(10, 10, 10)
surface2 = fig.add_subplot(111, projection='3d')
surface2.set_xlabel('x')
surface2.set_ylabel('t')
surface2.set_zlabel('u')
surface2.set_title('Surface Plot when dx=0.01')
surface2.plot_surface(xx2, tt2, u2)

```

Out[53]: <mpl\_toolkits.mplot3d.art3d.Poly3DCollection at 0x1f09ea3df08>



```

In [50]: x3 = np.asarray(df3.columns)
x3 = np.delete(x3,0).astype(float)
t3 = df3[['x']]
xx3, tt3 = np.meshgrid(x3, t3, sparse=True)
u3 = df3.drop(['x'], axis=1)
fig = plt.figure()
plt.gcf().set_size_inches(10, 10, 10)
surface3 = fig.add_subplot(111, projection='3d')
surface3.set_xlabel('x')
surface3.set_ylabel('t')
surface3.set_zlabel('u')
surface3.set_title('Surface Plot when dx=0.005')
surface3.plot_surface(xx3, tt3, u3)

```

Out[50]: <mpl\_toolkits.mplot3d.art3d.Poly3DCollection at 0x1f09cf6e508>

