9. Write a Python program to draw 3D Plots using Plotly Libraries.

Plotly is a Python library that is used to design graphs, especially interactive graphs. It can   plot various graphs and charts like histogram, barplot, boxplot, spreadplot, and many more. It is mainly used in data analysis as well as financial analysis. plotly is an interactive visualization library.

```
import plotly.express as px
df = px.data.iris()
df
```

Out[3]:

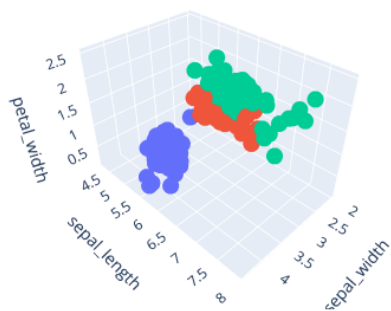|	sepal_length	sepal_width	petal_length	petal_width	species	species_id
0	5.1	3.5	1.4	0.2	setosa	1
1	4.9	3.0	1.4	0.2	setosa	1
2	4.7	3.2	1.3	0.2	setosa	1
3	4.6	3.1	1.5	0.2	setosa	1
4	5.0	3.6	1.4	0.2	setosa	1
...	...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	virginica	3
146	6.3	2.5	5.0	1.9	virginica	3
147	6.5	3.0	5.2	2.0	virginica	3
148	6.2	3.4	5.4	2.3	virginica	3
149	5.9	3.0	5.1	1.8	virginica	3

150 rows × 6 columns

i) case 1 scatter plot
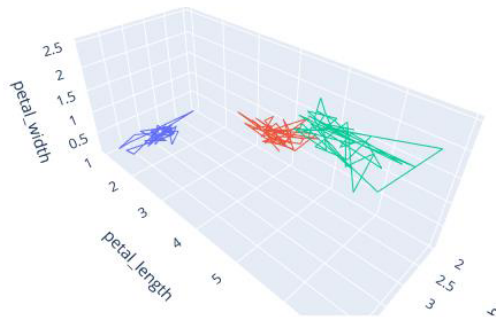
```
fig = px.scatter_3d(df, x = 'sepal_width',
            y = 'sepal_length',
            z = 'petal_width',
            color = 'species')

fig.show()
```

ii) case 2 line plot
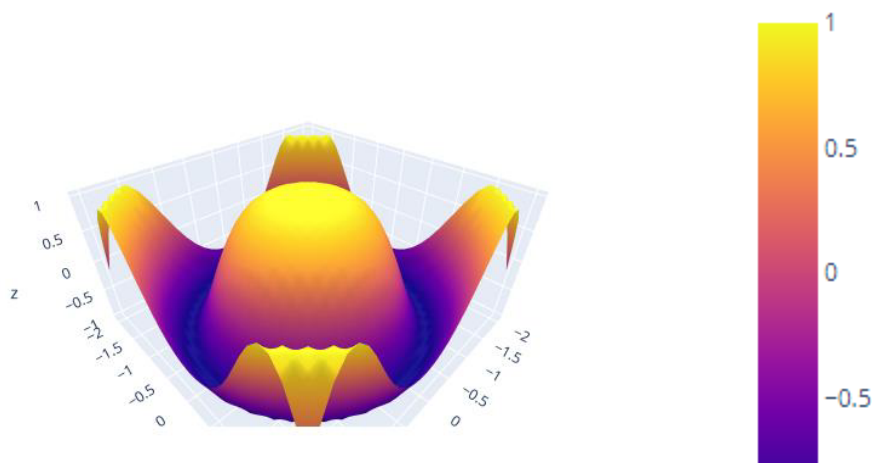
```python
import plotly.express as px
df = px.data.iris()
fig = px.line_3d(df, x="sepal_width",
                 y="petal_length",
                 z="petal_width",
                 color="species")
fig.show()
```


iii) case 3 surface plot

```python
import plotly.graph_objects as go
import numpy as np

x = np.outer(np.linspace(-2, 2, 30),
        np.ones(30))
y = x.copy().T
z = np.cos(x ** 2 + y ** 2)

fig = go.Figure(data=
        [go.Surface(x=x, y=y, z=z)])

fig.show()
```

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iv) case 4 mesh plot

A Mesh plot is a way to create a 3D set of triangles with vertices given by x, y, and z.

```python
import plotly.graph_objects as go
import numpy as np

# Data for three-dimensional scattered points
z = 15 * np.random.random(100)
x = np.sin(z) + 0.1 * np.random.randn(100)
y = np.cos(z) + 0.1 * np.random.randn(100)

fig = go.Figure(data=[go.Mesh3d(
  x=x, y=y, z=z, color='green', opacity=0.10)])

fig.show()
```