PLOT DECISION BOUNDARY

Github link to the jupyter notebook:
https://github.com/ashutosh-999/plt_dsn_bdry_jn.git

<u>SCREENSHOTS</u>

Neural Network model:

```python
class MoonModelV0(nn.Module):
  def __init__(self):
    super().__init__()
    self.layer_1 = nn.Linear(in_features = 2, out_features = 10)
    self.layer_2 = nn.Linear(in_features = 10, out_features = 10)
    self.layer_3 = nn.Linear(in_features = 10, out_features = 1)
    self.relu = nn.ReLU()

  def forward(self, x):
    return (self.layer_3(self.relu(self.layer_2(self.relu(self.layer_1(x))))))
```
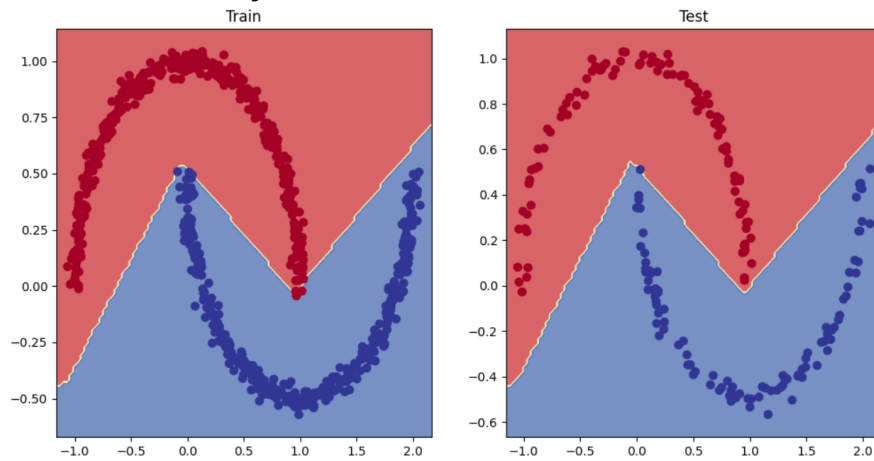
Moon Dataset:

a. **Optimizer and Loss Function used:**

```python
loss_fn = nn.BCEWithLogitsLoss()
optimizer = torch.optim.SGD(model_1.parameters(), lr = 0.01)
```

b. **Accuracy:**

```
Epoch: 840 | Loss: 0.04701 | Accuracy: 99.38% | Test Loss: 0.04221 | Test Accuracy: 99.50%
Epoch: 850 | Loss: 0.04680 | Accuracy: 99.38% | Test Loss: 0.04202 | Test Accuracy: 99.50%
Epoch: 860 | Loss: 0.04660 | Accuracy: 99.38% | Test Loss: 0.04183 | Test Accuracy: 99.50%
Epoch: 870 | Loss: 0.04640 | Accuracy: 99.38% | Test Loss: 0.04164 | Test Accuracy: 99.50%
Epoch: 880 | Loss: 0.04620 | Accuracy: 99.62% | Test Loss: 0.04145 | Test Accuracy: 99.50%
Epoch: 890 | Loss: 0.04601 | Accuracy: 99.62% | Test Loss: 0.04126 | Test Accuracy: 99.50%
Epoch: 900 | Loss: 0.04581 | Accuracy: 99.62% | Test Loss: 0.04107 | Test Accuracy: 99.50%
Epoch: 910 | Loss: 0.04562 | Accuracy: 99.62% | Test Loss: 0.04089 | Test Accuracy: 99.50%
Epoch: 920 | Loss: 0.04542 | Accuracy: 99.62% | Test Loss: 0.04070 | Test Accuracy: 99.50%
Epoch: 930 | Loss: 0.04523 | Accuracy: 99.62% | Test Loss: 0.04052 | Test Accuracy: 99.50%
Epoch: 940 | Loss: 0.04504 | Accuracy: 99.62% | Test Loss: 0.04034 | Test Accuracy: 99.50%
Epoch: 950 | Loss: 0.04485 | Accuracy: 99.62% | Test Loss: 0.04015 | Test Accuracy: 99.50%
Epoch: 960 | Loss: 0.04466 | Accuracy: 99.62% | Test Loss: 0.03997 | Test Accuracy: 99.50%
Epoch: 970 | Loss: 0.04447 | Accuracy: 99.75% | Test Loss: 0.03980 | Test Accuracy: 99.50%
Epoch: 980 | Loss: 0.04428 | Accuracy: 99.75% | Test Loss: 0.03962 | Test Accuracy: 99.50%
Epoch: 990 | Loss: 0.04410 | Accuracy: 99.75% | Test Loss: 0.03944 | Test Accuracy: 99.50%
```

c. Decision boundary

Spiral Dataset:

a. Optimizer and Loss Function used:

```
loss_fn2 = nn.CrossEntropyLoss()
optimizer = torch.optim.Adam(model_2.parameters(), lr = 0.01)
```

b. Accuracy:

```
Epoch: 0 | Loss: 1.10892, Acc: 0.32 | Test Loss: 1.02539, Test Acc: 0.50
Epoch: 100 | Loss: 0.02935, Acc: 0.99 | Test Loss: 0.00818, Test Acc: 1.00
Epoch: 200 | Loss: 0.02018, Acc: 0.99 | Test Loss: 0.00192, Test Acc: 1.00
Epoch: 300 | Loss: 0.01741, Acc: 0.99 | Test Loss: 0.00156, Test Acc: 1.00
Epoch: 400 | Loss: 0.01553, Acc: 0.99 | Test Loss: 0.00045, Test Acc: 1.00
Epoch: 500 | Loss: 0.01480, Acc: 0.99 | Test Loss: 0.00009, Test Acc: 1.00
Epoch: 600 | Loss: 0.01456, Acc: 0.99 | Test Loss: 0.00006, Test Acc: 1.00
Epoch: 700 | Loss: 0.01423, Acc: 0.99 | Test Loss: 0.00002, Test Acc: 1.00
Epoch: 800 | Loss: 0.01423, Acc: 0.99 | Test Loss: 0.00001, Test Acc: 1.00
Epoch: 900 | Loss: 0.01410, Acc: 0.99 | Test Loss: 0.00000, Test Acc: 1.00
```

c. Decision boundary