DEEP BOSE
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GitHub: https://github.com/DeepBose2004/logistic_regression

Loading Datasets

In [43]:
```
from Logistic_Regression.models.utils import loadData

x, y = loadData()
```

In [44]:
```
x.head()
```

Out[44]:

	3.8915	4.2105
0	3.6898	6.6051
1	2.7763	7.5057
2	3.1137	5.7724
3	2.9251	5.4315
4	3.6699	6.4406

In [45]:
```
y.head()
```

Out[45]:

	0
0	0
1	0
2	0
3	0
4	0

Normalisation

In [46]:
```
from Logistic_Regression.models.utils import MinMaxScaler

scaler = MinMaxScaler()
xNorm = scaler.fitTransform(x)
yNorm = scaler.fitTransform(y)
```

In [47]:
```
xNorm.head()
```

Out[47]:

	3.8915	4.2105
0	0.322538	0.849108
1	0.191576	1.000000
2	0.239947	0.709592
3	0.212908	0.652475
4	0.319685	0.821546

In [48]:
```
yNorm.head()
```

Out[48]:

	0
0	0.0
1	0.0
2	0.0
3	0.0
4	0.0

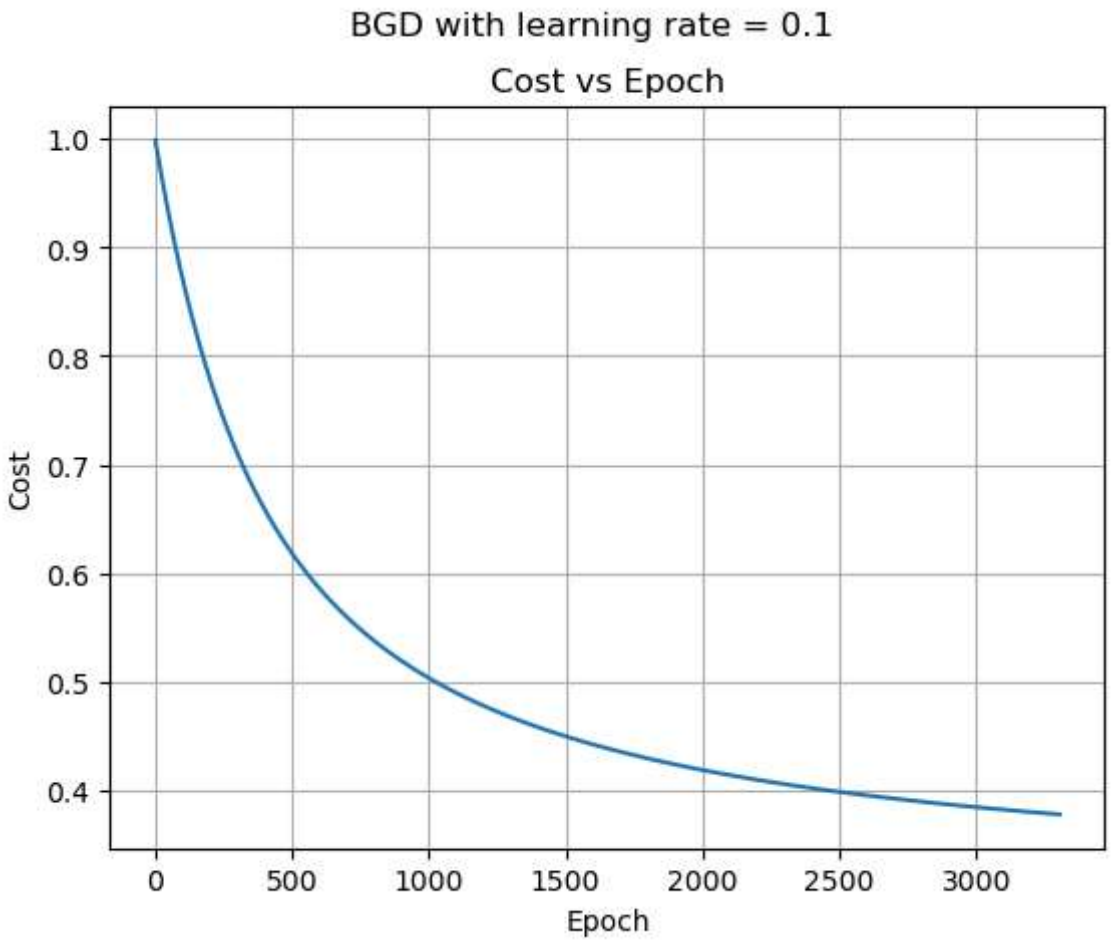
BGD until convergence with learning rate = 0.1

In [49]:
```
from Logistic_Regression.models.utils import LogisticRegression
import numpy as np

model = LogisticRegression()
lr = 0.1
finCost = model.fit(xNorm, yNorm, epochs=5000, learning_rate=lr)
eg = np.array([[xNorm.mean().iloc[0], yNorm.mean().iloc[0]]])
yHat = model.predict(eg)
print(f"Prediction for input ({eg}) =", yHat[0][0])
print(f"Final cost = {finCost}")
print(f"Parameters:\tw = {model.w}, b = {model.b}")
```

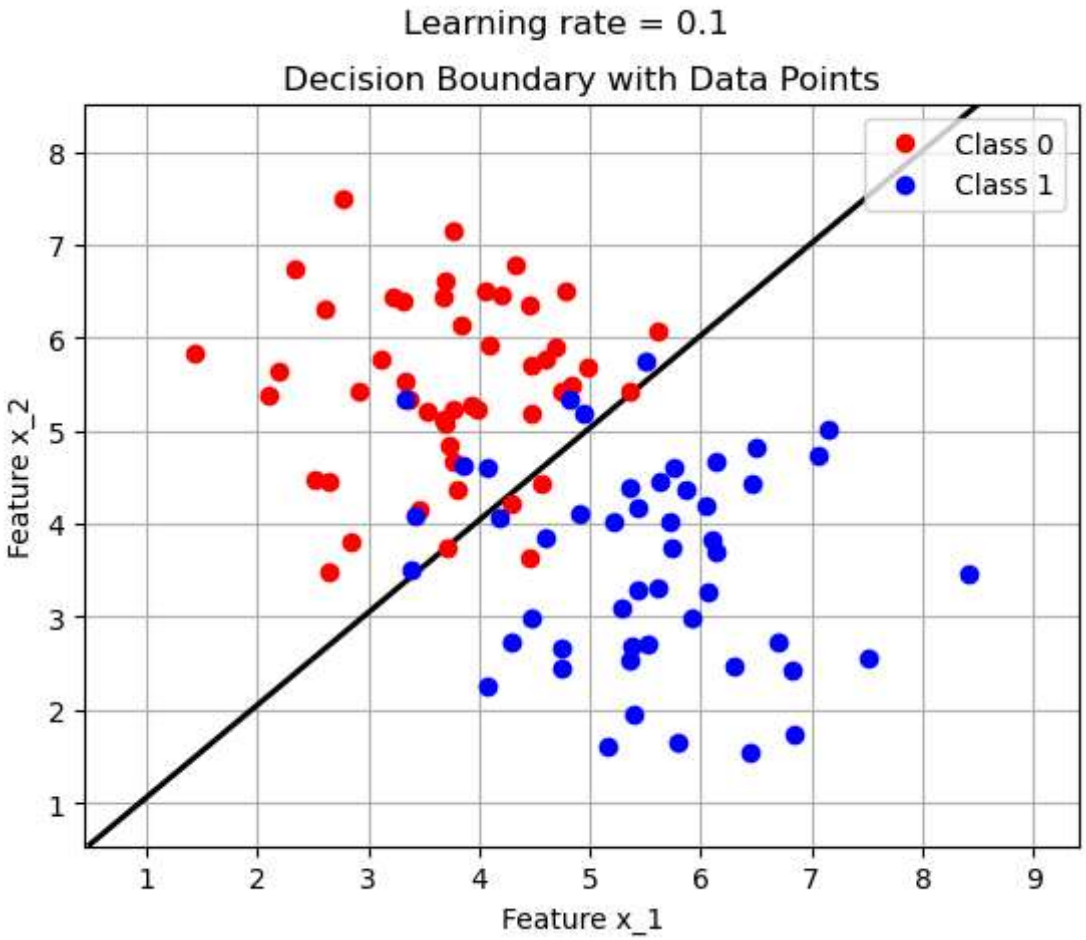
```
Prediction for input ([[0.45676353 0.50505051]]) = 1
Final cost = 0.37787475909925594
Parameters:     w = [[ 6.91479057]
 [-6.96696498]], b = 0.4863303181144615
```

In [50]:
```
model.plotCost(f"BGD with learning rate = {lr}")
```



Decision Boundary

In [51]:
```
model.decisionBoundary(x, y, subtitle=f"Learning rate = {0.1}")
```



Confusion Matrix

In [52]:
```
yHat = model.predict(x)
cm = model.confusionMatrix(y, yHat)
print("Confusion Matrix:")
print(cm)
```

```
Confusion Matrix:
[[42  4]
 [ 8 45]]
```

Classification Report

In [53]:
```
accuracy, precision, recall, f1Score = model.classificationReport(y, yHat)
print("Classification Report:")
print(f"Accuracy = {accuracy}")
print(f"Precision = {precision}")
print(f"Recall = {recall}")
print(f"F1-Score = {f1Score}")
```

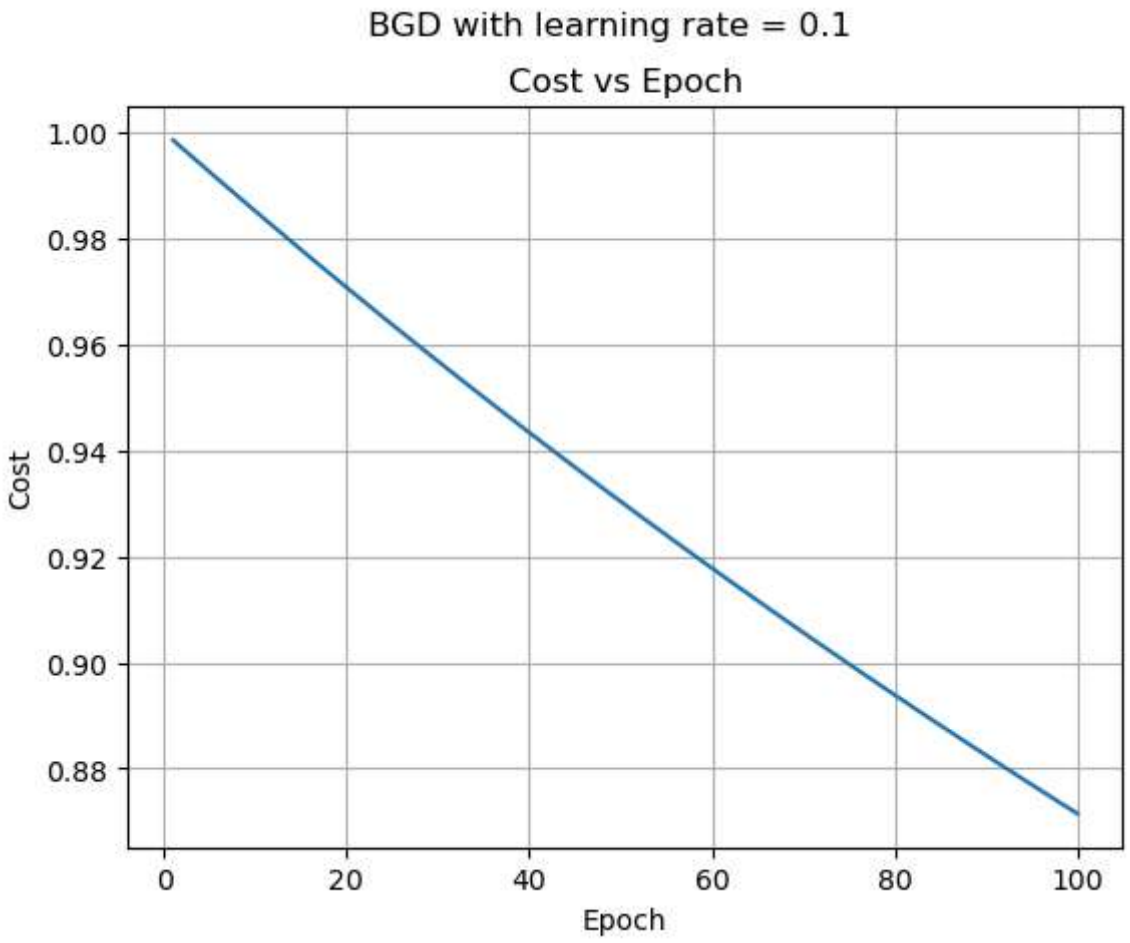
```
Classification Report:
Accuracy = 0.46464646464646464
Precision = 0.84
Recall = 0.4827586206896552
F1-Score = 0.6131386861313869
```

BGD up to 100 epochs with learning rate = 0.1

In [54]:
```
from Logistic_Regression.models.utils import LogisticRegression

lr = 0.1
model = LogisticRegression()
model.fit(xNorm, yNorm, epochs=100, learning_rate=lr)
yHat = model.predict(eg)
costs1 = model.costs
print(f"Prediction for input ({eg}) =", yHat[0][0])
model.plotCost(f"BGD with learning rate = {lr}")
```

```
Prediction for input ([[0.45676353 0.50505051]]) = 0
```

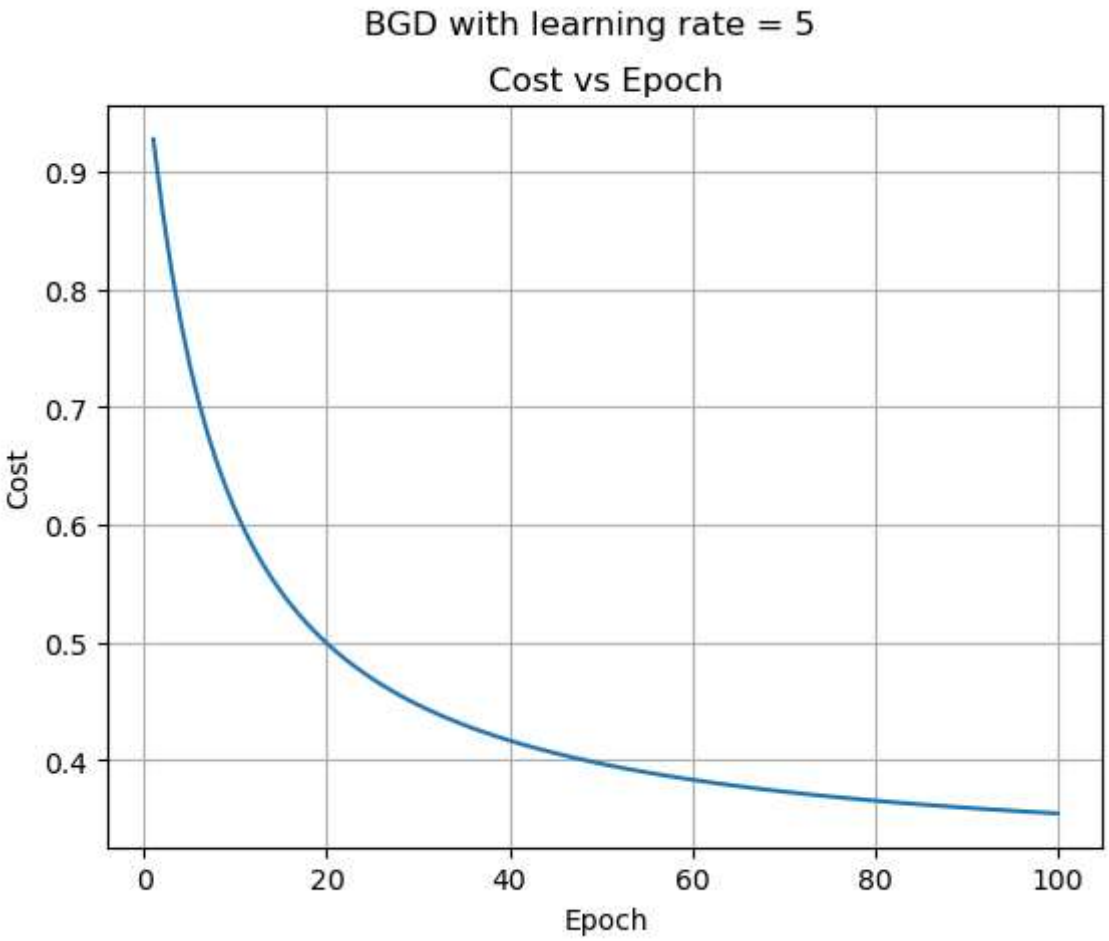


In [55]:
```
from Logistic_Regression.models.utils import LogisticRegression

lr = 5
model = LogisticRegression()
```

```
model.fit(xNorm, yNorm, epochs=100, learning_rate=lr)
yHat = model.predict(eg)
costs2 = model.costs
print(f"Prediction for input ({eg}) =", yHat[0][0])
model.plotCost(f"BGD with learning rate = {lr}")
```

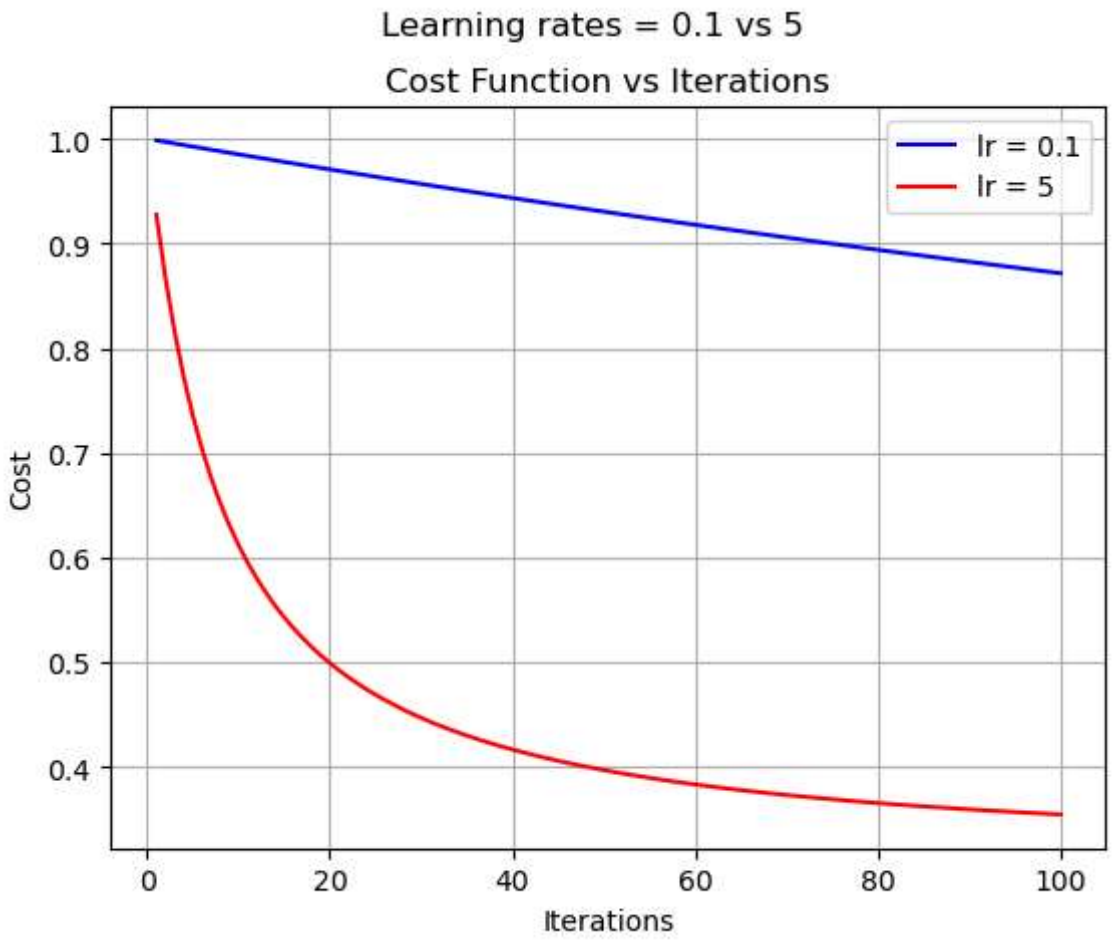
```
Prediction for input ([[0.45676353 0.50505051]]) = 1
```



Comparison

In [56]:
```
from Logistic_Regression.models.utils import compareCosts

compareCosts(costs1, costs2, epochs=100, subtitle=f"Learning rates = 0.1 vs 5")
```


Learning rates = 0.1 vs 5
Cost Function vs Iterations
lr = 0.1
lr = 5
Cost
Iterations
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0
20
40
60
80
100

In [ ]: