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In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
```

In [2]:
```
X = np.array([1,2,3,4,5,6,7,8,9], dtype=float)
y = np.array([3,4,2,5,6,7,8,9,10], dtype=float)
```

In [3]:
```
m = 0
c = 0
```

In [4]:
```
alpha = 0.01
```

In [5]:
```
loss_history = []
```

In [6]:
```
for i in range(1000):
    y_pred = m * X + c

    loss = (1/len(X)) * np.sum((y_pred - y)**2)
    loss_history.append(loss)

    dm = (2/len(X)) * np.sum((y_pred - y) * X)
    dc = (2/len(X)) * np.sum((y_pred - y))

    m = m - alpha * dm
    c = c - alpha * dc
```

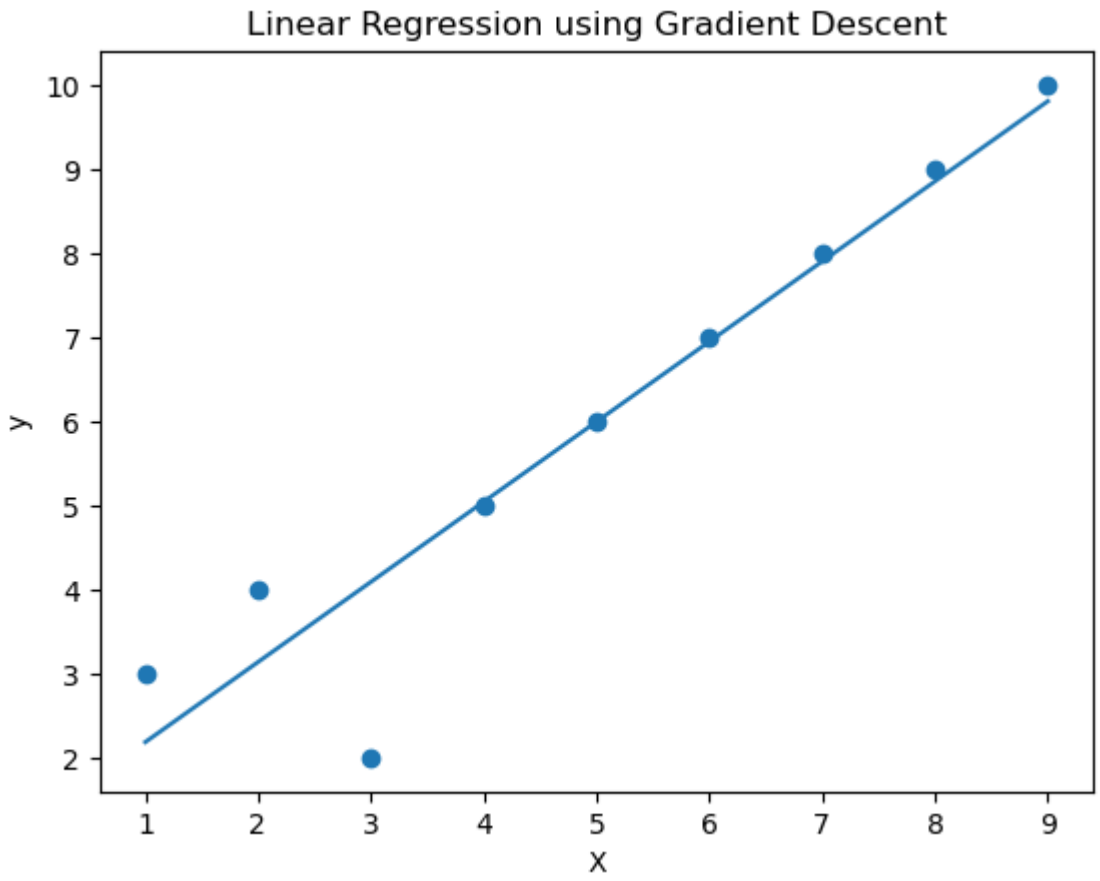
In [7]:
```
print("Optimized slope (m):", m)
```

```
Optimized slope (m): 0.9527787370300854
```

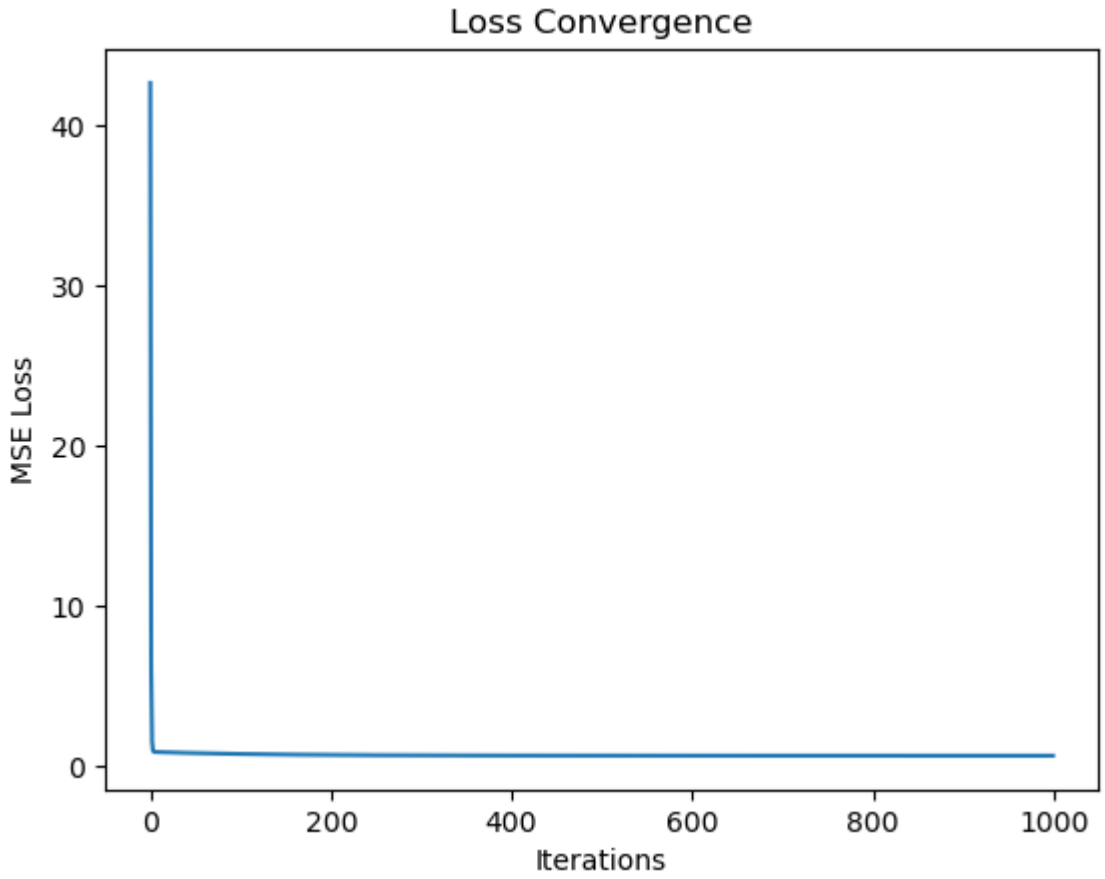
In [8]:
```
print("Optimized intercept (c):", c)
```

```
Optimized intercept (c): 1.2325154675411367
```

In [9]:
```
plt.scatter(X, y)
plt.plot(X, m*X + c)
plt.title("Linear Regression using Gradient Descent")
plt.xlabel("X")
plt.ylabel("y")
plt.show()
```



In [10]:
```
plt.plot(loss_history)
plt.title("Loss Convergence")
plt.xlabel("Iterations")
plt.ylabel("MSE Loss")
plt.show()
```


Loss Convergence
MSE Loss
Iterations
0
10
20
30
40
0
200
400
600
800
1000

In [ ]: