Name: Raghav Sharma

Roll no: 25201313

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.datasets import load_iris
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score
```

In [2]:
```
iris = load_iris()
X = iris.data
y = iris.target
```

In [3]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_
```

In [4]:
```
k_values = range(1, 106)
accuracy_scores = []
```

In [5]:
```
for k in k_values:
    knn = KNeighborsClassifier(n_neighbors=k)

    knn.fit(X_train, y_train)

    y_pred = knn.predict(X_test)

    accuracy = accuracy_score(y_test, y_pred)
    accuracy_scores.append(accuracy)

    print(f"K = {k:2d}, Accuracy = {accuracy:.4f}")
```

```
K =  1, Accuracy = 1.0000
K =  2, Accuracy = 1.0000
K =  3, Accuracy = 1.0000
K =  4, Accuracy = 1.0000
K =  5, Accuracy = 1.0000
K =  6, Accuracy = 1.0000
K =  7, Accuracy = 1.0000
K =  8, Accuracy = 1.0000
K =  9, Accuracy = 1.0000
K = 10, Accuracy = 1.0000
K = 11, Accuracy = 1.0000
K = 12, Accuracy = 1.0000
K = 13, Accuracy = 1.0000
K = 14, Accuracy = 1.0000
K = 15, Accuracy = 1.0000
K = 16, Accuracy = 1.0000
K = 17, Accuracy = 1.0000
K = 18, Accuracy = 1.0000
K = 19, Accuracy = 1.0000
K = 20, Accuracy = 1.0000
K = 21, Accuracy = 1.0000
K = 22, Accuracy = 1.0000
K = 23, Accuracy = 1.0000
K = 24, Accuracy = 1.0000
K = 25, Accuracy = 1.0000
K = 26, Accuracy = 1.0000
K = 27, Accuracy = 1.0000
K = 28, Accuracy = 1.0000
K = 29, Accuracy = 1.0000
K = 30, Accuracy = 1.0000
K = 31, Accuracy = 1.0000
K = 32, Accuracy = 1.0000
K = 33, Accuracy = 0.9778
K = 34, Accuracy = 0.9778
K = 35, Accuracy = 0.9778
K = 36, Accuracy = 1.0000
K = 37, Accuracy = 1.0000
K = 38, Accuracy = 1.0000
K = 39, Accuracy = 1.0000
K = 40, Accuracy = 1.0000
K = 41, Accuracy = 1.0000
K = 42, Accuracy = 0.9778
K = 43, Accuracy = 0.9778
K = 44, Accuracy = 0.9778
K = 45, Accuracy = 0.9778
K = 46, Accuracy = 0.9778
K = 47, Accuracy = 0.9778
K = 48, Accuracy = 0.9556
K = 49, Accuracy = 0.9333
K = 50, Accuracy = 0.9556
K = 51, Accuracy = 0.9556
K = 52, Accuracy = 0.9556
K = 53, Accuracy = 0.9556
K = 54, Accuracy = 0.9333
K = 55, Accuracy = 0.8889
K = 56, Accuracy = 0.9111
K = 57, Accuracy = 0.9111
K = 58, Accuracy = 0.9333
K = 59, Accuracy = 0.9111
K = 60, Accuracy = 0.9556
```

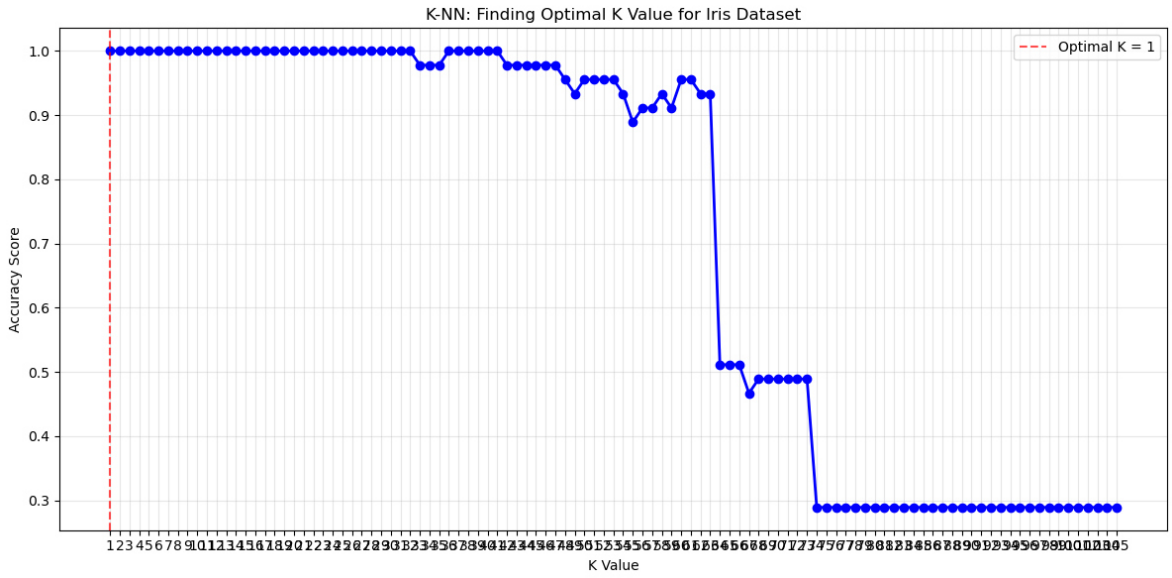
```
K = 61, Accuracy = 0.9556
K = 62, Accuracy = 0.9333
K = 63, Accuracy = 0.9333
K = 64, Accuracy = 0.5111
K = 65, Accuracy = 0.5111
K = 66, Accuracy = 0.5111
K = 67, Accuracy = 0.4667
K = 68, Accuracy = 0.4889
K = 69, Accuracy = 0.4889
K = 70, Accuracy = 0.4889
K = 71, Accuracy = 0.4889
K = 72, Accuracy = 0.4889
K = 73, Accuracy = 0.4889
K = 74, Accuracy = 0.2889
K = 75, Accuracy = 0.2889
K = 76, Accuracy = 0.2889
K = 77, Accuracy = 0.2889
K = 78, Accuracy = 0.2889
K = 79, Accuracy = 0.2889
K = 80, Accuracy = 0.2889
K = 81, Accuracy = 0.2889
K = 82, Accuracy = 0.2889
K = 83, Accuracy = 0.2889
K = 84, Accuracy = 0.2889
K = 85, Accuracy = 0.2889
K = 86, Accuracy = 0.2889
K = 87, Accuracy = 0.2889
K = 88, Accuracy = 0.2889
K = 89, Accuracy = 0.2889
K = 90, Accuracy = 0.2889
K = 91, Accuracy = 0.2889
K = 92, Accuracy = 0.2889
K = 93, Accuracy = 0.2889
K = 94, Accuracy = 0.2889
K = 95, Accuracy = 0.2889
K = 96, Accuracy = 0.2889
K = 97, Accuracy = 0.2889
K = 98, Accuracy = 0.2889
K = 99, Accuracy = 0.2889
K = 100, Accuracy = 0.2889
K = 101, Accuracy = 0.2889
K = 102, Accuracy = 0.2889
K = 103, Accuracy = 0.2889
K = 104, Accuracy = 0.2889
K = 105, Accuracy = 0.2889
```

In [6]:
```python
best_k = k_values[np.argmax(accuracy_scores)]
best_accuracy = max(accuracy_scores)
```

In [7]:
```python
print(f"\n{'='*50}")
print(f"OPTIMAL K VALUE: {best_k}")
print(f"MAXIMUM ACCURACY: {best_accuracy:.4f}")
print(f"{'='*50}")
```

```
==================================================
OPTIMAL K VALUE: 1
MAXIMUM ACCURACY: 1.0000
==================================================
```

In [8]:
```
plt.figure(figsize=(12, 6))
plt.plot(k_values, accuracy_scores, marker='o', linestyle='-', color='b', linewi
plt.axvline(x=best_k, color='r', linestyle='--', alpha=0.7, label=f'Optimal K =
plt.xlabel('K Value')
plt.ylabel('Accuracy Score')
plt.title('K-NN: Finding Optimal K Value for Iris Dataset')
plt.xticks(k_values)
plt.grid(True, alpha=0.3)
plt.legend()
plt.tight_layout()
plt.show()
```



In [9]:
```
print("\nTOP 5 PERFORMING K VALUES:")
sorted_indices = np.argsort(accuracy_scores)[::-1]  # Sort in descending order
for i, idx in enumerate(sorted_indices[:5]):
    print(f"{i+1}. K = {k_values[idx]:2d} - Accuracy: {accuracy_scores[idx]:.4f}
```

```
TOP 5 PERFORMING K VALUES:
1. K =  1 - Accuracy: 1.0000
2. K = 30 - Accuracy: 1.0000
3. K = 22 - Accuracy: 1.0000
4. K = 23 - Accuracy: 1.0000
5. K = 24 - Accuracy: 1.0000
```

In [ ]:

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