Grid Classification Assignment

Comparison Results:

1. SVM-Grid Classification:

- F1 Score:

```
The f1_macro value for best parameter {'C': 10, 'gamma': 'auto', 'kernel': 'sigmoid'}: 0.9834018801410106
```

- Confusion Matrix:

```
The confusion Matrix:
 [[45  0]
 [ 2 73]]
```

- Clf_report:

```
The report:
              precision    recall  f1-score   support

          no       0.96      1.00      0.98        45
         yes       1.00      0.97      0.99        75

    accuracy                           0.98       120
   macro avg       0.98      0.99      0.98       120
weighted avg       0.98      0.98      0.98       120
```

- Roc_auc_score:

```
np.float64(0.9997037037037036)
```

2. Decision tree Grid:

- F1 Score:

```
The f1_macro value for best parameter {'criterion': 'gini', 'max_features': 'log2', 'splitter': 'random'}: 0.9474624675931296
```

- Confusion Matrix:

```
The confusion Matrix:
 [[48  3]
 [ 4 78]]
```

- Clf_report:

```
The report:
              precision    recall  f1-score   support

          no       0.92      0.94      0.93        51
         yes       0.96      0.95      0.96        82

    accuracy                           0.95       133
   macro avg       0.94      0.95      0.94       133
weighted avg       0.95      0.95      0.95       133
```

- Roc_auc_score

```
np.float64(0.9461979913916786)
```

3. **RF-Grid-Classification:**
   - F1 Score

```
The f1_macro value for best parameter {'criterion': 'gini', 'max_features': 'sqrt', 'n_estimators': 10}: 0.983333
```

   - Confusion Matrix:

```
The confusion Matrix:
 [[44  1]
 [ 1 74]]
```

   - Clf_report:

```
The report:
              precision    recall  f1-score   support

          no       0.98      0.98      0.98        45
         yes       0.99      0.99      0.99        75

    accuracy                           0.98       120
   macro avg       0.98      0.98      0.98       120
weighted avg       0.98      0.98      0.98       120
```

   - Roc_auc_score

```
np.float64(0.5)
```

4. **Logistics-Grid:**
   - F1 Score:

```
The f1_macro value for best parameter {'penalty': 'l2', 'solver': 'newton-cg'}: 0.991684
```

   - Confusion Matrix:

```
The confusion Matrix:
 [[45  0]
 [ 1 74]]
```

   - Clf_report:

```
The report:
              precision    recall  f1-score   support

          no       0.98      1.00      0.99        45
         yes       1.00      0.99      0.99        75

    accuracy                           0.99       120
   macro avg       0.99      0.99      0.99       120
weighted avg       0.99      0.99      0.99       120
```

   - Roc_auc_score:

```
np.float64(1.0)
```

5. **KNN:**

- Confusion Matrix:

```
[[37  8]
 [27 48]]
```

- Clf_reoport:

	precision	recall	f1-score	support
no	0.58	0.82	0.68	45
yes	0.86	0.64	0.73	75
accuracy			0.71	120
macro avg	0.72	0.73	0.71	120
weighted avg	0.75	0.71	0.71	120

6. **Navie Baye's: MultinomialNB**

- Confusion Matrix:

```
[[44  1]
 [22 53]]
```

- Clf_report:

	precision	recall	f1-score	support
no	0.67	0.98	0.79	45
yes	0.98	0.71	0.82	75
accuracy			0.81	120
macro avg	0.82	0.84	0.81	120
weighted avg	0.86	0.81	0.81	120