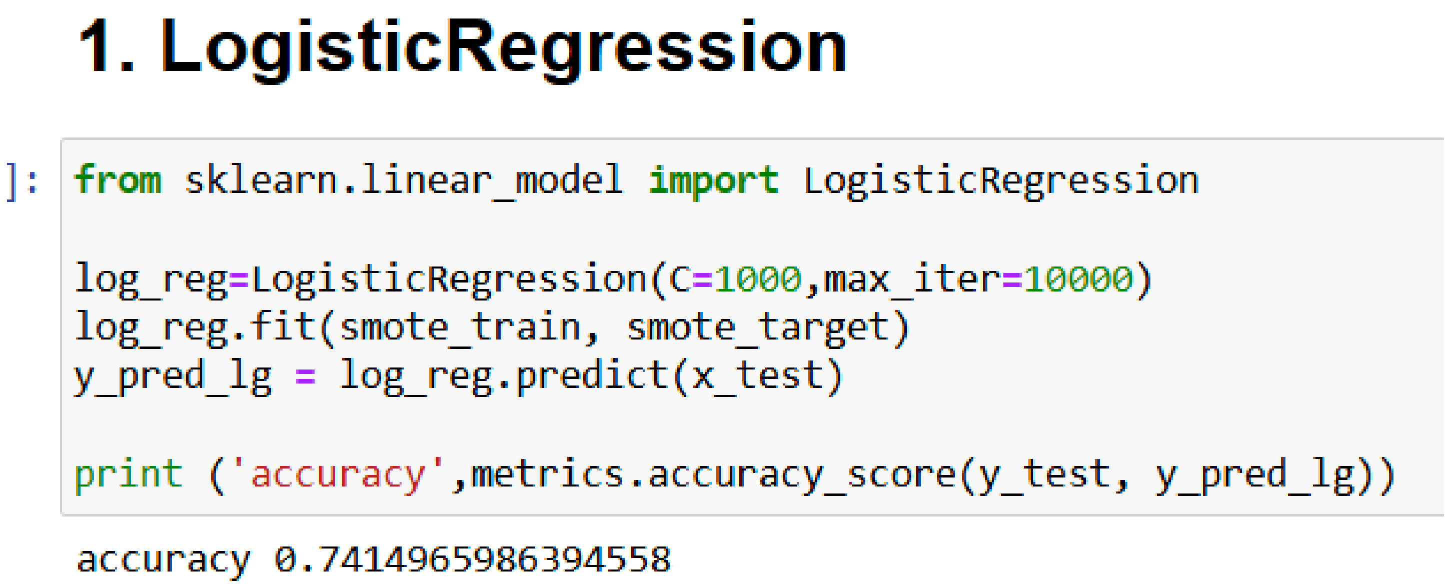
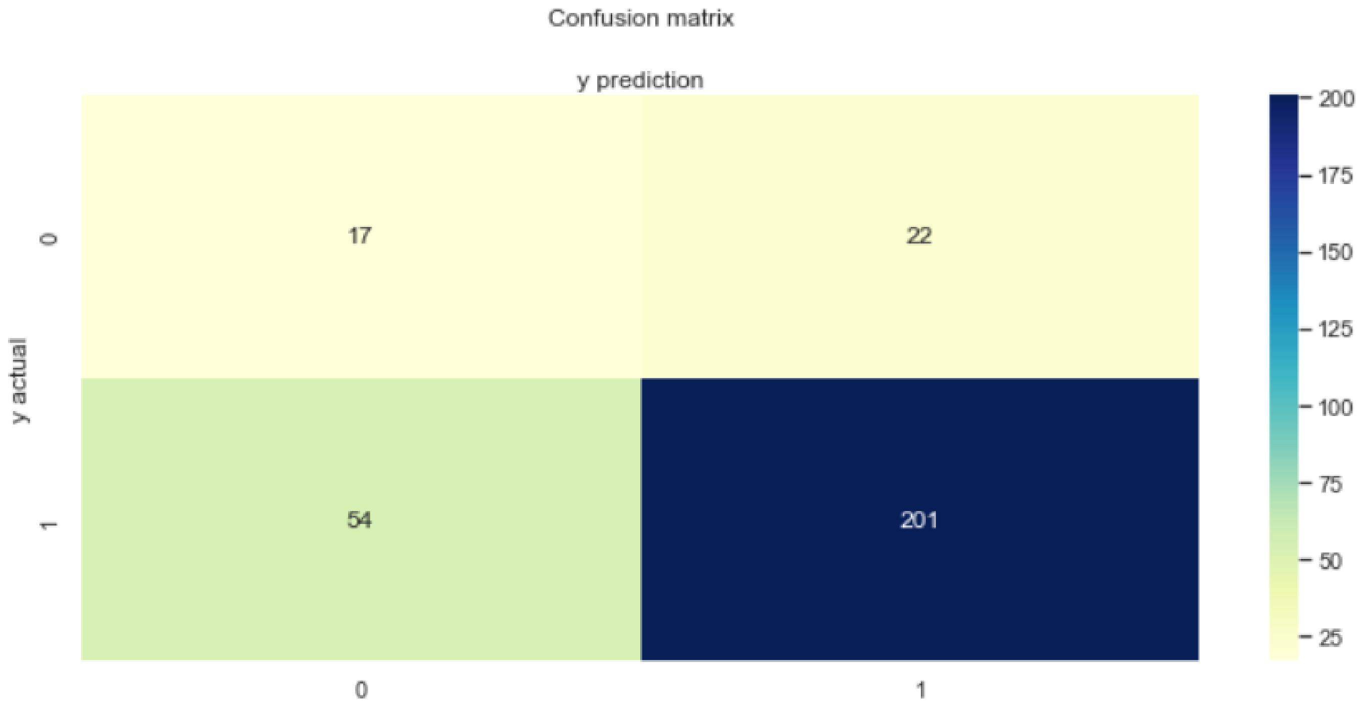
1. Logistic Regression



1. LogisticRegression

```
]: from sklearn.linear_model import LogisticRegression

   log_reg=LogisticRegression(C=1000,max_iter=10000)
   log_reg.fit(smote_train, smote_target)
   y_pred_lg = log_reg.predict(x_test)

   print ('accuracy',metrics.accuracy_score(y_test, y_pred_lg))
```

```
accuracy 0.7414965986394558
```



```
              precision    recall  f1-score   support


           2       0.24      0.44      0.31        39

           3       0.90      0.79      0.84       255


    accuracy                           0.74       294

   macro avg       0.57      0.61      0.58       294

weighted avg       0.81      0.74      0.77       294
```

2. Random Forest

1. RandomForest

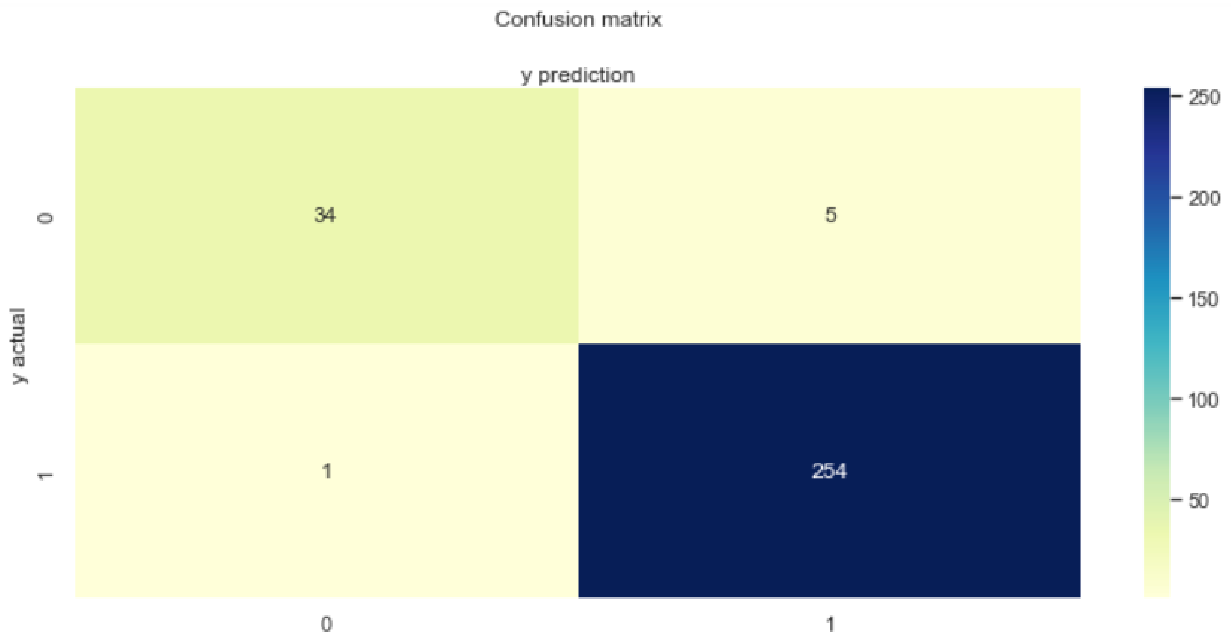
In [97]:

```
from sklearn.ensemble import RandomForestClassifier
```

In [103]:

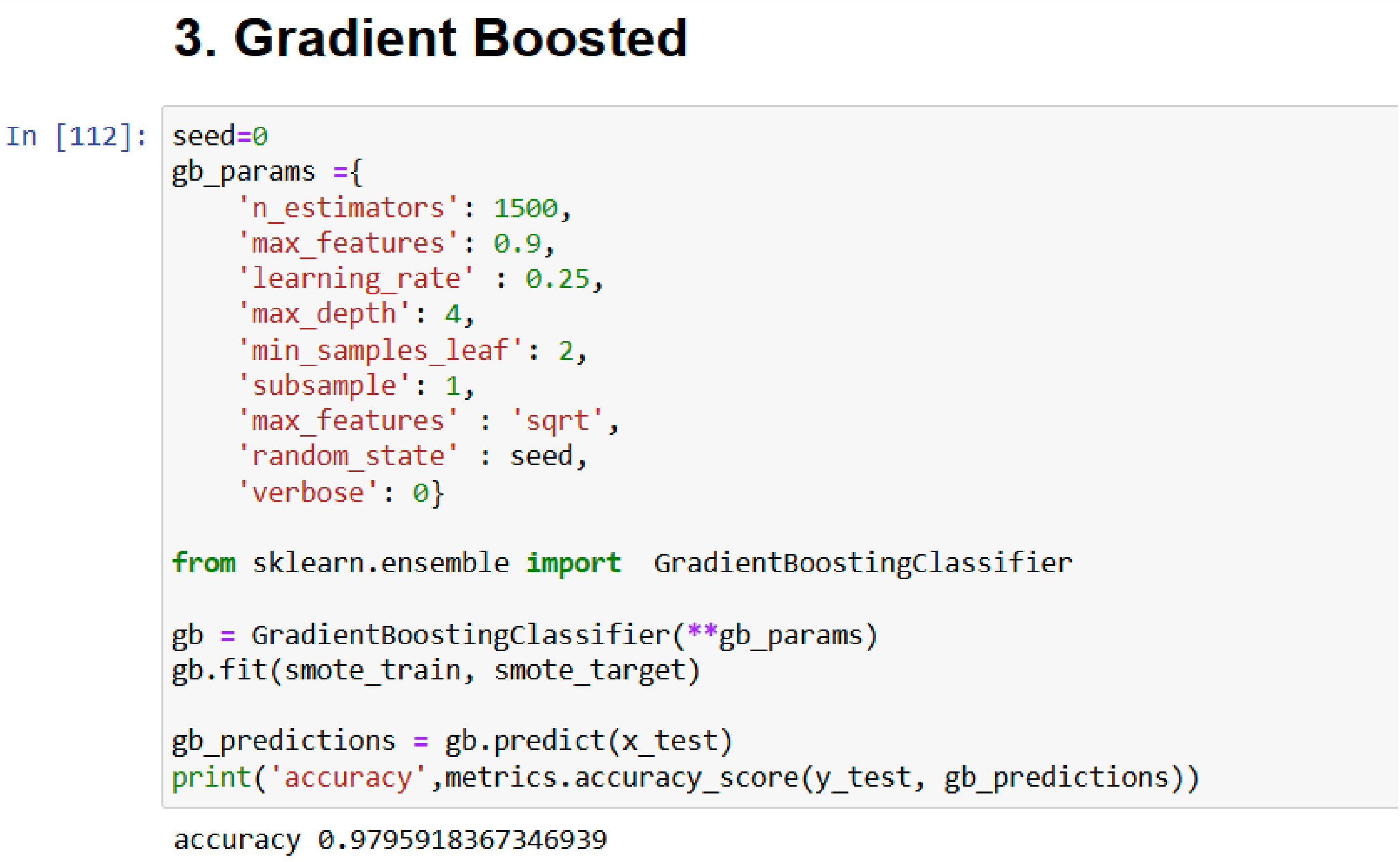
```
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.2, random_state = 42)

rfc = RandomForestClassifier()
rfc = rfc.fit(smote_train , smote_target)
y_pred = rfc.predict(x_test)

print ('accuracy',metrics.accuracy_score(y_test, y_pred))
```

```
accuracy 0.9795918367346939
```



```
              precision    recall  f1-score   support


           2       0.97      0.87      0.92        39

           3       0.98      1.00      0.99       255


    accuracy                           0.98       294

   macro avg       0.98      0.93      0.95       294

weighted avg       0.98      0.98      0.98       294
```

3. Gradient Boosted

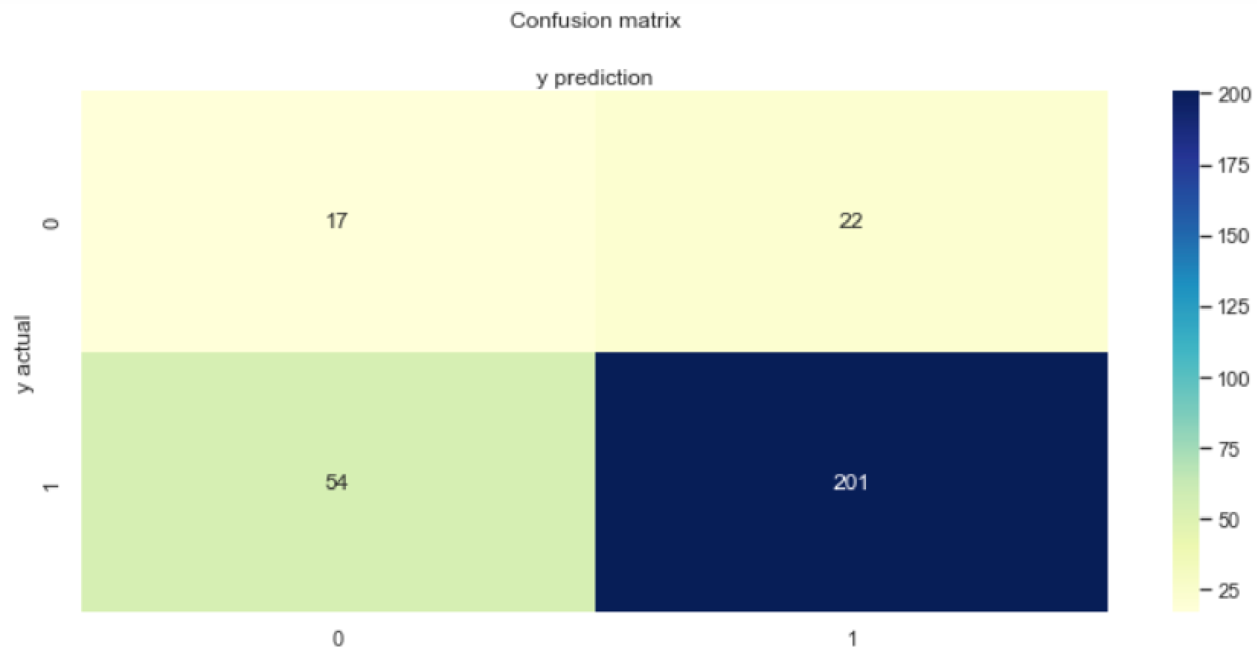


3. Gradient Boosted

In [112]:

```
seed=0
gb_params ={
    'n_estimators': 1500,
    'max_features': 0.9,
    'learning_rate' : 0.25,
    'max_depth': 4,
    'min_samples_leaf': 2,
    'subsample': 1,
    'max_features' : 'sqrt',
    'random_state' : seed,
    'verbose': 0}

from sklearn.ensemble import  GradientBoostingClassifier

gb = GradientBoostingClassifier(**gb_params)
gb.fit(smote_train, smote_target)

gb_predictions = gb.predict(x_test)
print('accuracy',metrics.accuracy_score(y_test, gb_predictions))
```

```
accuracy 0.9795918367346939
```



```
              precision    recall  f1-score   support


           2       0.95      0.90      0.92        39
           3       0.98      0.99      0.99       255


    accuracy                           0.98       294
   macro avg       0.97      0.94      0.95       294
weighted avg       0.98      0.98      0.98       294
```