In [ ]:
```
import pandas as pd
import numpy as np
from sklearn import svm
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split
from sklearn.linear_model import Perceptron
from sklearn.linear_model import LogisticRegression
from sklearn import metrics
from sklearn.metrics import accuracy_score
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.metrics import plot_confusion_matrix,classification_report,plot_precision_recall_curve,plot_roc_curve
from sklearn.neighbors import KNeighborsClassifier
import warnings
warnings.filterwarnings('ignore')
```

Read Data

In [ ]:
```
df =pd.read_csv('Default_Fin.csv')
```

In [ ]:
```
df.head() ## index ไม่จำเป็น
```

Out[ ]:

	Index	Employed	Bank Balance	Annual Salary	Defaulted?
0	1	1	8754.36	532339.56	0
1	2	0	9806.16	145273.56	0
2	3	1	12882.60	381205.68	0
3	4	1	6351.00	428453.88	0
4	5	1	9427.92	461562.00	0

In [ ]:
```
df = df.drop(['Index'],axis=1)
```

In [ ]:
```
df.info() #no-null
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10000 entries, 0 to 9999
Data columns (total 4 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Employed       10000 non-null  int64
 1   Bank Balance   10000 non-null  float64
 2   Annual Salary  10000 non-null  float64
 3   Defaulted?     10000 non-null  int64
dtypes: float64(2), int64(2)
memory usage: 312.6 KB
```

In [ ]:
```
df.describe()
```

Out[ ]:

	Employed	Bank Balance	Annual Salary	Defaulted?
count	10000.000000	10000.000000	10000.000000	10000.000000

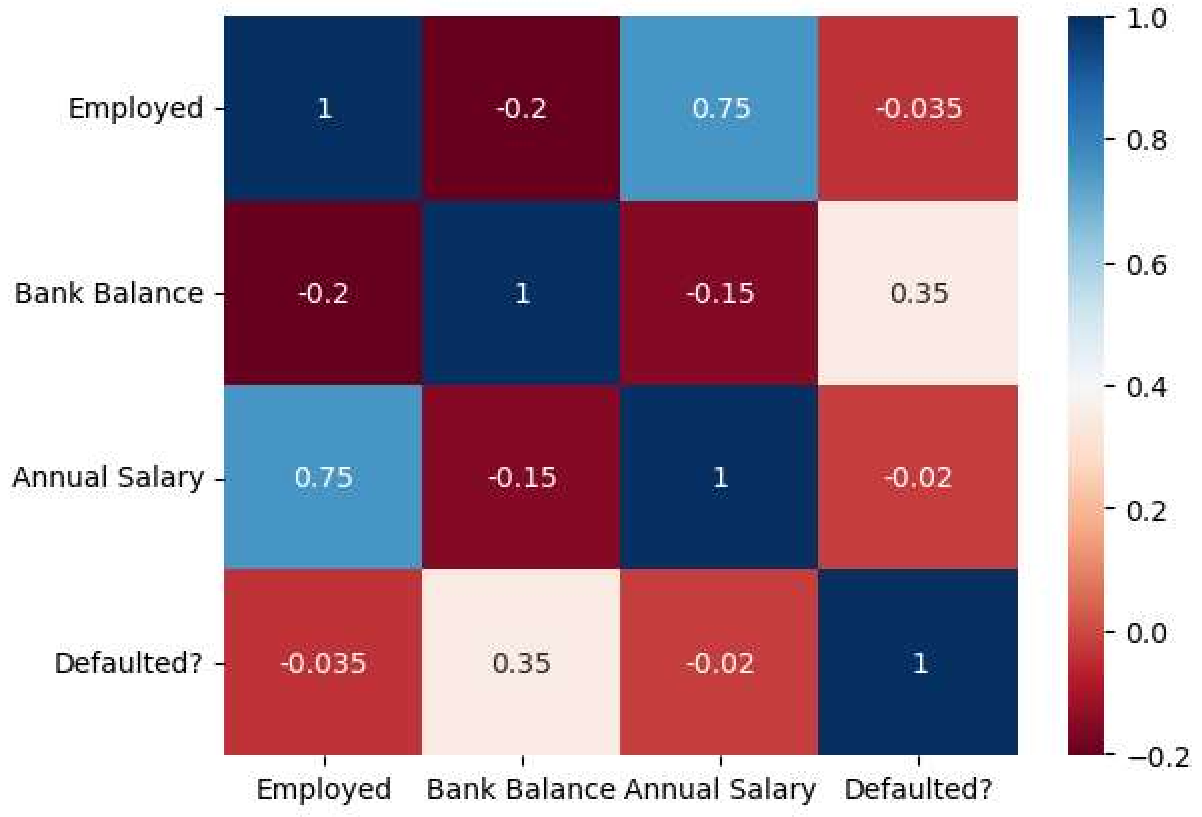
	Employed	Bank Balance	Annual Salary	Defaulted?
mean	0.705600	10024.498524	402203.782224	0.033300
std	0.455795	5804.579486	160039.674988	0.179428
min	0.000000	0.000000	9263.640000	0.000000
25%	0.000000	5780.790000	256085.520000	0.000000
50%	1.000000	9883.620000	414631.740000	0.000000
75%	1.000000	13995.660000	525692.760000	0.000000
max	1.000000	31851.840000	882650.760000	1.000000

mean : Bank Balance -> 10024

Mostly Annual Salary -> 402203

Analysis

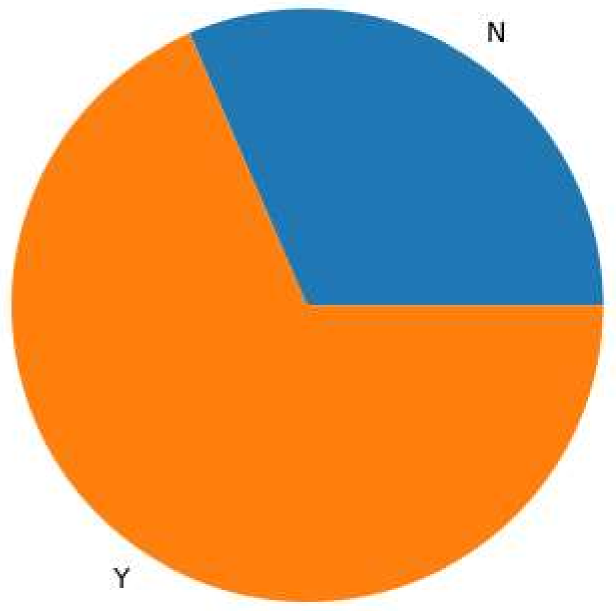
In [ ]:
```
sns.heatmap(df.corr(),annot=True, cmap="RdBu")
plt.show()
```



เมื่อเอาคอลัมน์ของข้อมูลมาเปรียบเทียบกับตัว label (Deafulted) จะได้ความสัมพันธ์ดังนี้

- Defaulted จะมีความสัมพันธ์กับ Bank Balance และ Annual Salary ตามลำดับ

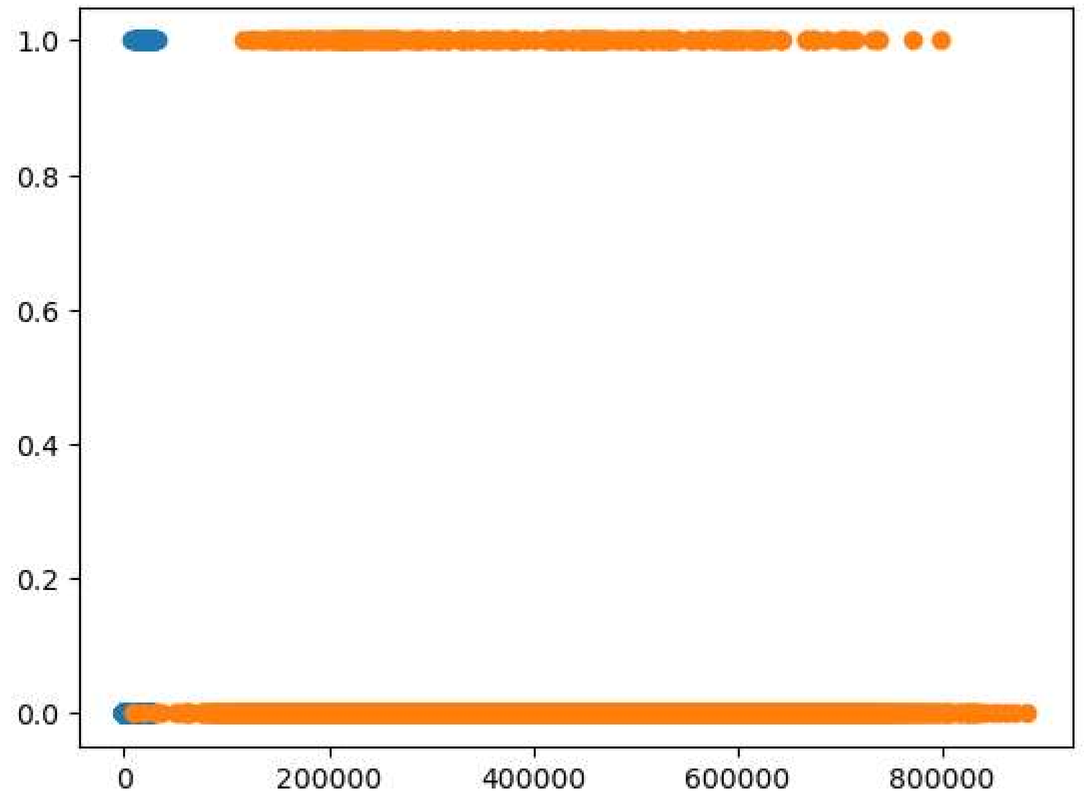
In [ ]:
```
chart = np.array([df[df['Defaulted?']==0]['Bank Balance'].mean(),df[df['Defaulted?']==1]['Bank Balance'].mean()])
mylabels = ['N','Y']
plt.pie(chart,labels= mylabels)
plt.show()
```



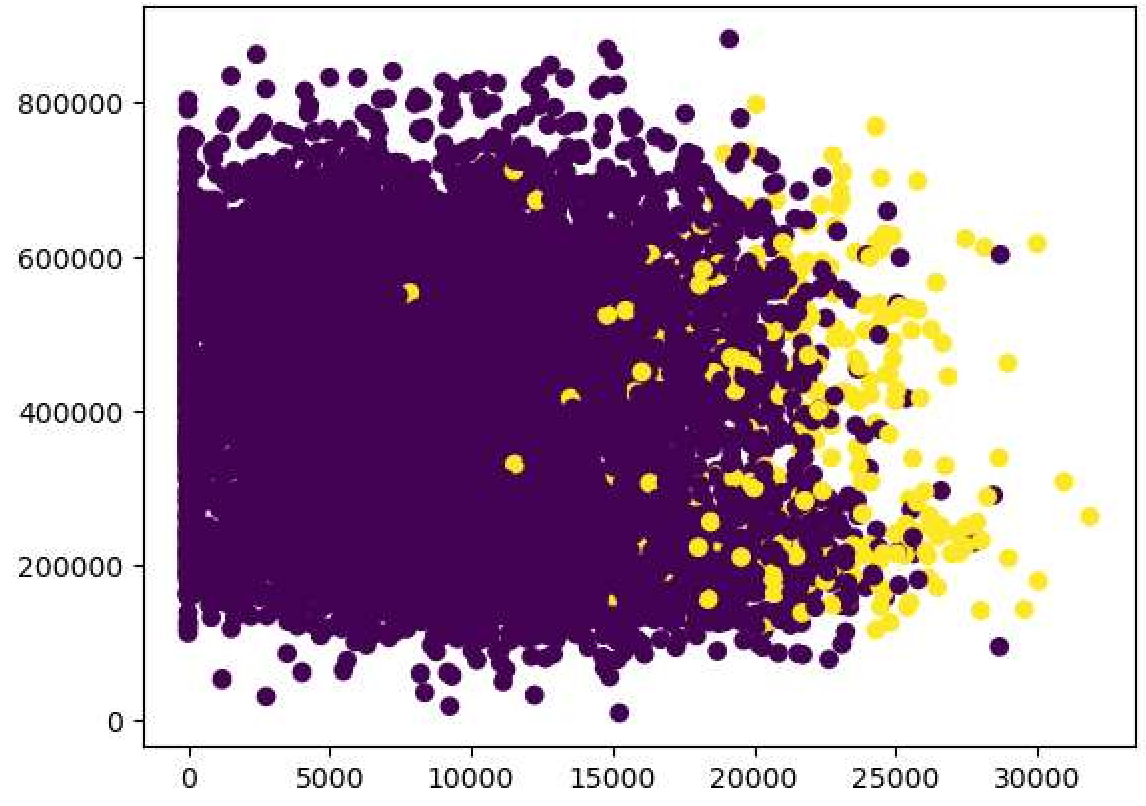
ค่าเฉลี่ยค่าเงินในข้อมูลมีความใกล้เคียงกัน

หาความสัมพันธ์

In [ ]:
```
plt.scatter(df['Bank Balance'],df['Defaulted?'])
plt.scatter(df['Annual Salary'],df['Defaulted?'])
plt.show()
```



In [ ]:
```
plt.scatter(df['Bank Balance'],df['Annual Salary'],c=df['Defaulted?'])
plt.show()
```



Train

In [ ]:
```
df = df.drop(['Employed'],axis=1)
```

In [ ]:
```
x=df.drop(['Defaulted?'],axis=1).values
y = df['Defaulted?'].values
model = LogisticRegression(class_weight='balanced')
knn = KNeighborsClassifier(n_neighbors=3)
per = Perceptron()
y = y.reshape(-1,1)
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2,random_state=0)
model.fit(x_train,y_train)
knn.fit(x_train,y_train)
per.fit(x_train,y_train)
```

Out[ ]:
```
Perceptron()
```

Comparing the models to find the best fit model

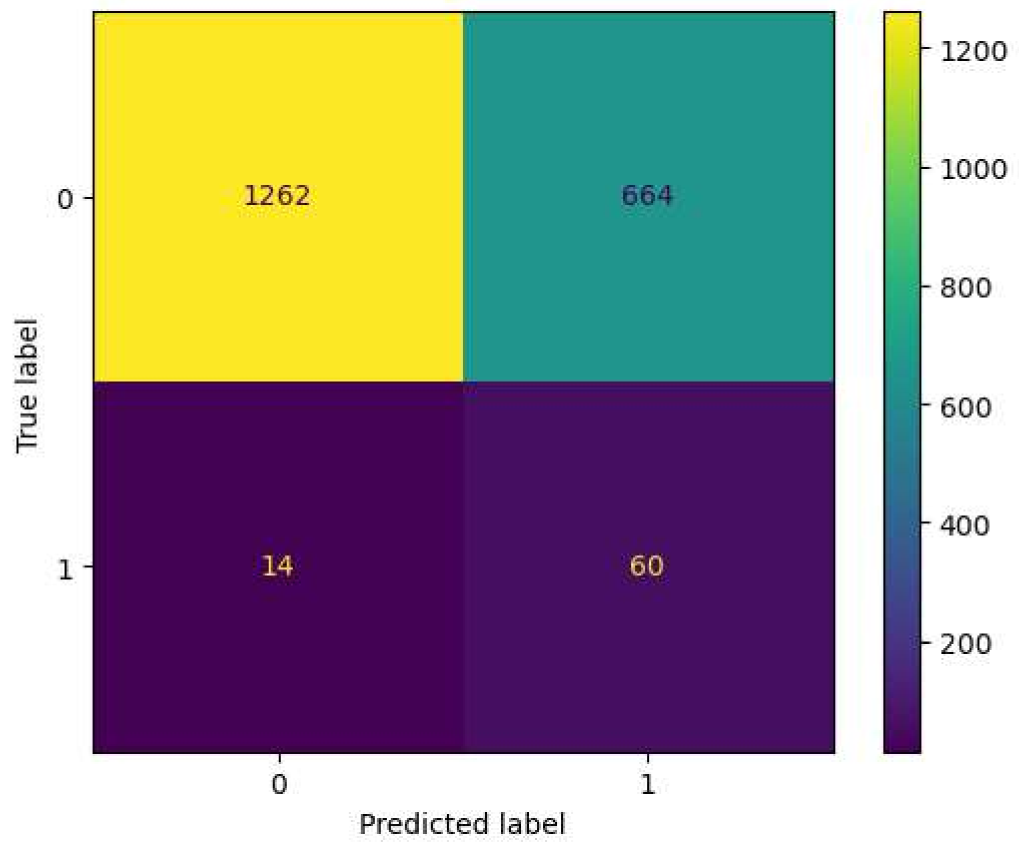
In [ ]:
```
def report(model):
    preds = model.predict(x_test)
    print(classification_report(preds,y_test))
    plot_confusion_matrix(model,x_test,y_test)
    plt.show()
```

In [ ]:
```
print("LOGISTIC REGRESSION MODEL")
report(model)
```

```
LOGISTIC REGRESSION MODEL
              precision    recall  f1-score   support
```

```
          0       0.66      0.99      0.79      1276
          1       0.81      0.08      0.15       724

   accuracy                           0.66      2000
  macro avg       0.73      0.54      0.47      2000
weighted avg       0.71      0.66      0.56      2000
```



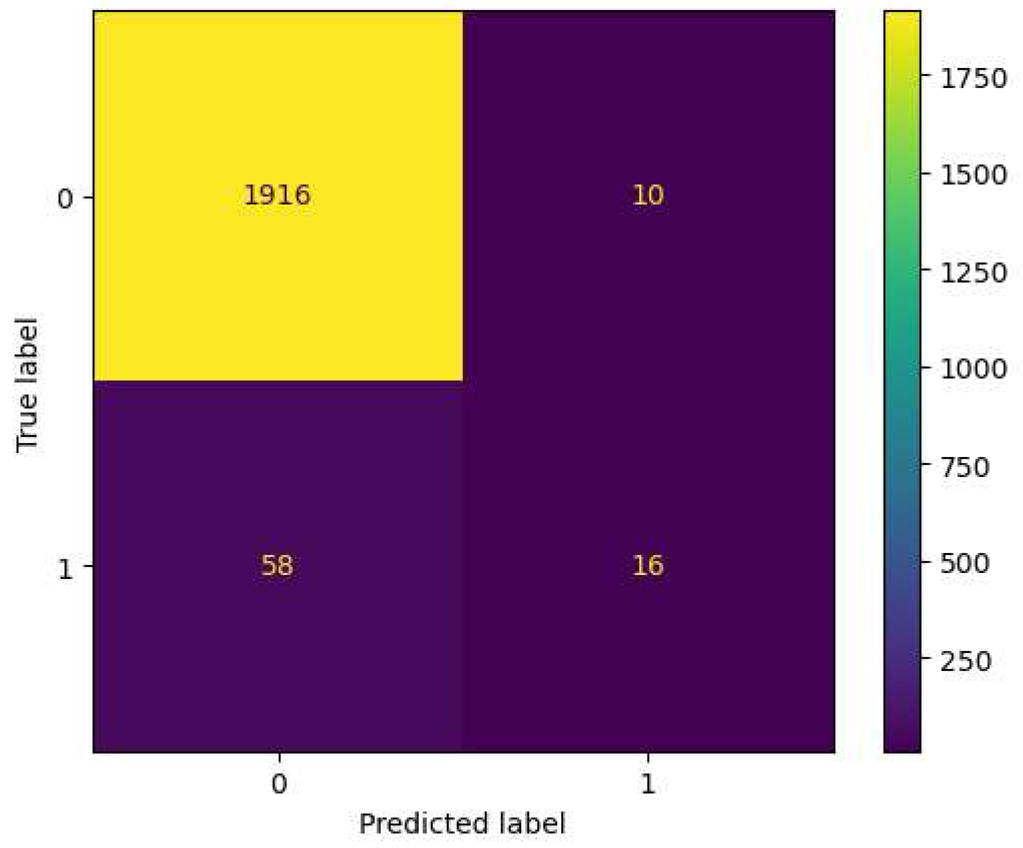
In [ ]:

```
print("KNN MODEL")
report(knn)
```

```
KNN MODEL
              precision    recall  f1-score   support

          0       0.99      0.97      0.98      1974
          1       0.22      0.62      0.32        26

   accuracy                           0.97      2000
  macro avg       0.61      0.79      0.65      2000
weighted avg       0.98      0.97      0.97      2000
```



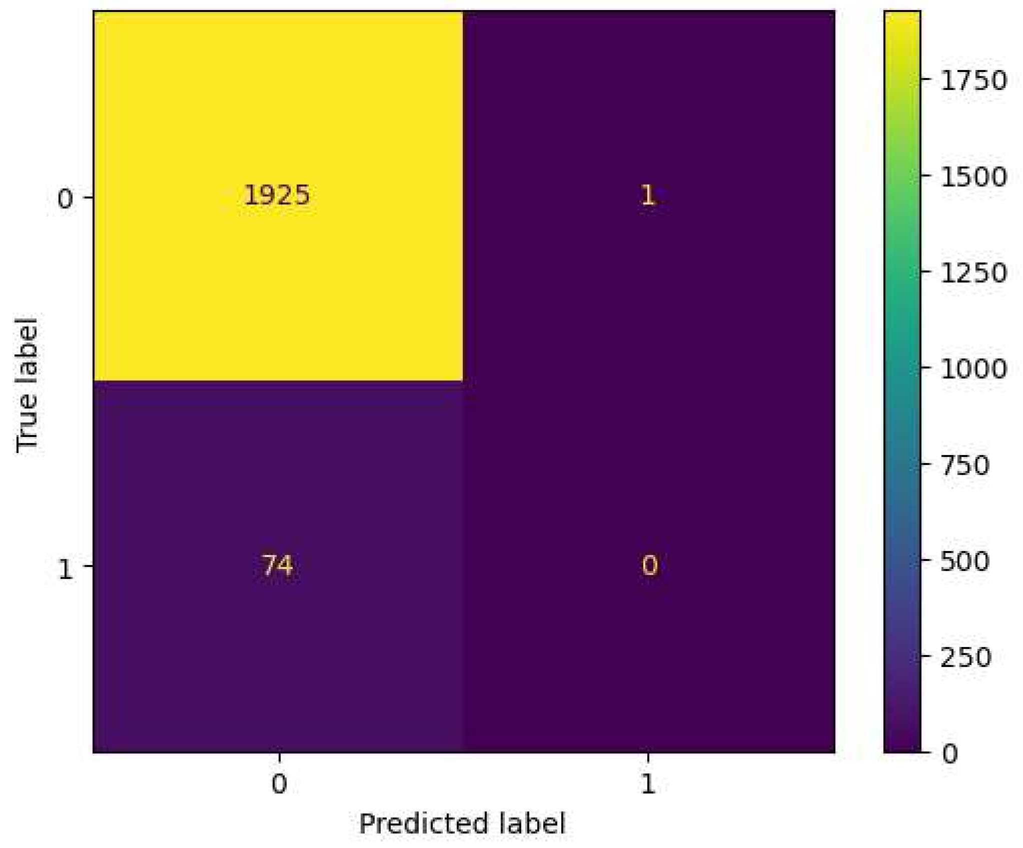
In [ ]:

```
print("Percepton MODEL")
report(per)
```

```
Percepton MODEL
              precision    recall  f1-score   support

           0       1.00      0.96      0.98      1999
           1       0.00      0.00      0.00         1

    accuracy                           0.96      2000
   macro avg       0.50      0.48      0.49      2000
weighted avg       1.00      0.96      0.98      2000
```



```
In [ ]:
print(pd.DataFrame(np.array([
    ["logistic regression",accuracy_score(y_test,model.predict(x_test))],
    ["KNN ",accuracy_score(y_test,knn.predict(x_test))],
    ["Percepton ",accuracy_score(y_test,per.predict(x_test))],
]),columns=['Model','Accuracy']
))
```

```
                 Model Accuracy
0  logistic regression    0.661
1                 KNN     0.966
2           Percepton    0.9625
```

```
In [ ]:
```