In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [3]:
```
df = pd.read_csv('emails.csv')
df.head()
```

Out[3]:

	Email No.	the	to	ect	and	for	of	a	you	hou	...	connevey	jay	valued	l
0	Email 1	0	0	1	0	0	0	2	0	0	...	0	0	0	
1	Email 2	8	13	24	6	6	2	102	1	27	...	0	0	0	
2	Email 3	0	0	1	0	0	0	8	0	0	...	0	0	0	
3	Email 4	0	5	22	0	5	1	51	2	10	...	0	0	0	
4	Email 5	7	6	17	1	5	2	57	0	9	...	0	0	0	

5 rows × 3002 columns

In [5]:
```
df.isnull().sum()
```

Out[5]:
```
Email No.     0
the           0
to            0
ect           0
and           0
             ..
military      0
allowing      0
ff            0
dry           0
Prediction    0
Length: 3002, dtype: int64
```

In [6]:
```
df.dropna(how='any',inplace=True)
```

In [7]:
```
x = df.iloc[:,1:-1].values
y = df.iloc[:,-1].values
```

In [8]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.25,random_sta
```

In [68]:
```
from sklearn.metrics import ConfusionMatrixDisplay,confusion_matrix,accuracy_s
def report(classifier):
    y_pred = classifier.predict(x_test)
    cm = confusion_matrix(y_test,y_pred)
```

```
    display = ConfusionMatrixDisplay(cm,display_labels=classifier.classes_)
    display.plot()
    print(f"Accuracy:  {accuracy_score(y_test,y_pred)}")
    print(f"Precision Score:  {precision_score(y_test,y_pred)}")
    print(f"Recall Score:  {recall_score(y_test,y_pred)}")
    plot_precision_recall_curve(classifier,x_test,y_test)
    plot_roc_curve(classifier,x_test,y_test)
```

K-Nearest Neighbours Classifier

In [69]:
```
from sklearn.neighbors import KNeighborsClassifier
```

In [70]:
```
kNN = KNeighborsClassifier(n_neighbors=10)
kNN.fit(x_train,y_train)
```

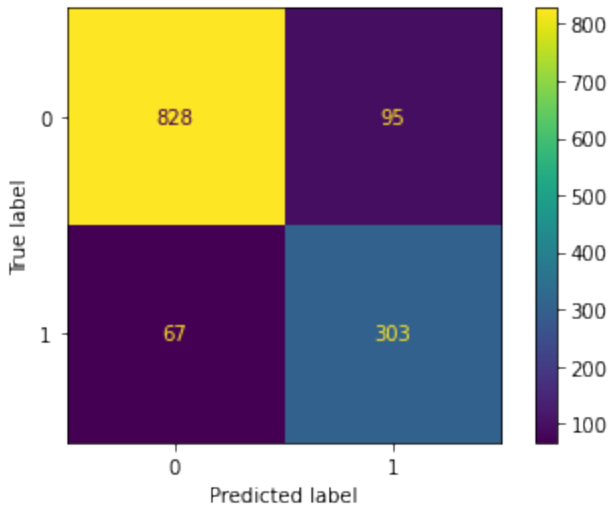
Out[70]:

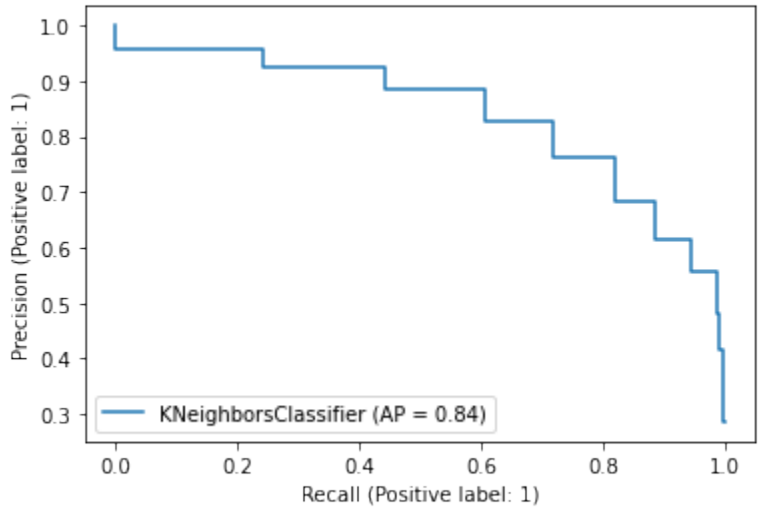
▾ KNeighborsClassifier

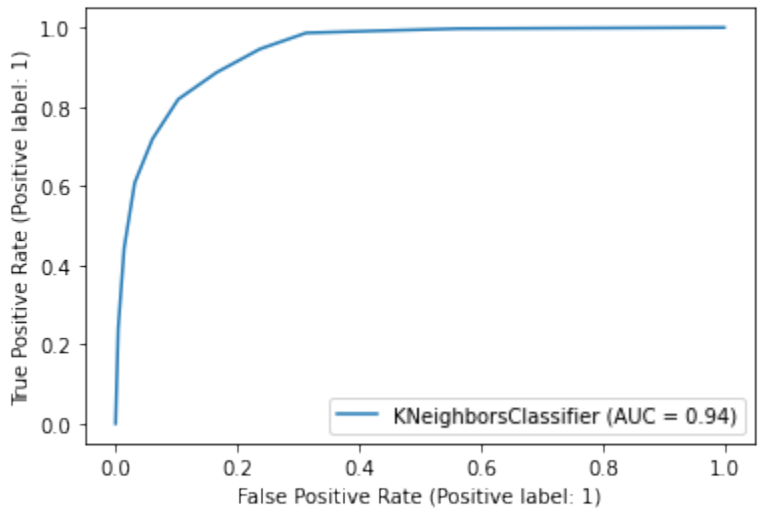
KNeighborsClassifier(n_neighbors=10)

In [71]:
```
report(kNN)
```

```
Accuracy:  0.8747099767981439
Precision Score:  0.7613065326633166
Recall Score:  0.8189189189189189
/home/pratik/.local/lib/python3.8/site-packages/sklearn/utils/deprecation.py:8
7: FutureWarning: Function plot_precision_recall_curve is deprecated; Function
`plot_precision_recall_curve` is deprecated in 1.0 and will be removed in 1.2.
Use one of the class methods: PrecisionRecallDisplay.from_predictions or Precis
ionRecallDisplay.from_estimator.
  warnings.warn(msg, category=FutureWarning)
/home/pratik/.local/lib/python3.8/site-packages/sklearn/utils/deprecation.py:8
7: FutureWarning: Function plot_roc_curve is deprecated; Function :func:`plot_r
oc_curve` is deprecated in 1.0 and will be removed in 1.2. Use one of the class
methods: :meth:`sklearn.metrics.RocCurveDisplay.from_predictions` or :meth:`skl
earn.metrics.RocCurveDisplay.from_estimator`.
  warnings.warn(msg, category=FutureWarning)
```







In [74]:
```
from sklearn.svm import SVC
svm = SVC(gamma='auto',random_state=10)
svm.fit(x_train,y_train)
```

Out[74]:

SVC

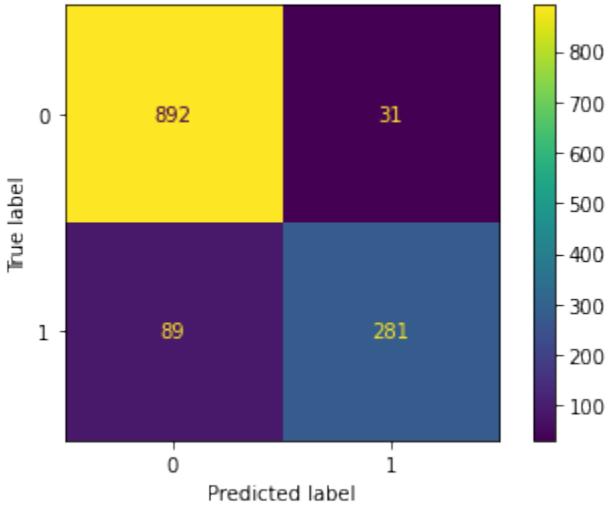
```
SVC(gamma='auto', random_state=10)
```

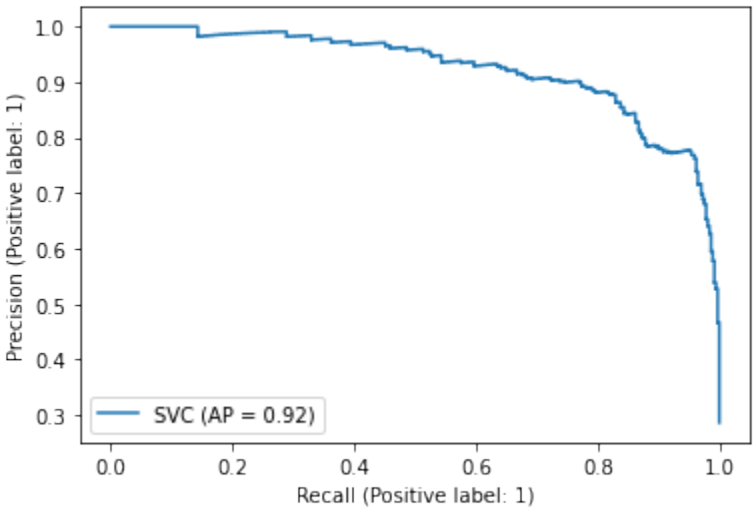
In [75]:

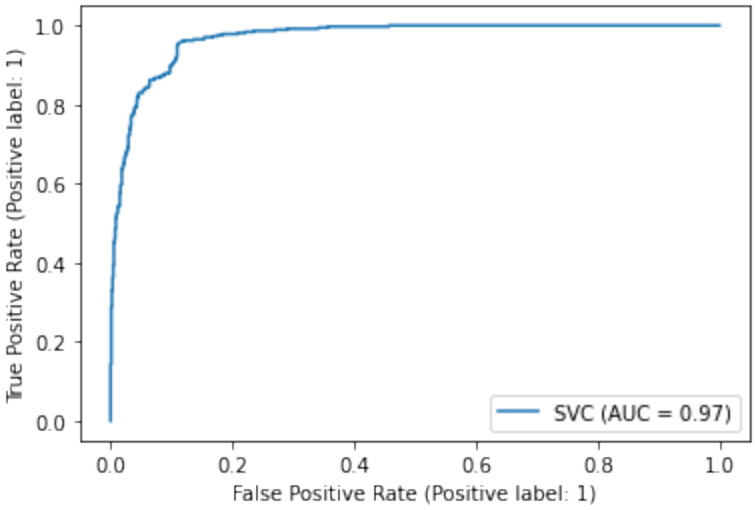
```
report(svm)
```

```
Accuracy:  0.9071925754060325
Precision Score:  0.9006410256410257
Recall Score:  0.7594594594594595
```

```
/home/pratik/.local/lib/python3.8/site-packages/sklearn/utils/deprecation.py:8
7: FutureWarning: Function plot_precision_recall_curve is deprecated; Function
`plot_precision_recall_curve` is deprecated in 1.0 and will be removed in 1.2.
Use one of the class methods: PrecisionRecallDisplay.from_predictions or Precis
ionRecallDisplay.from_estimator.
  warnings.warn(msg, category=FutureWarning)
/home/pratik/.local/lib/python3.8/site-packages/sklearn/utils/deprecation.py:8
7: FutureWarning: Function plot_roc_curve is deprecated; Function :func:`plot_r
oc_curve` is deprecated in 1.0 and will be removed in 1.2. Use one of the class
methods: :meth:`sklearn.metrics.RocCurveDisplay.from_predictions` or :meth:`skl
earn.metrics.RocCurveDisplay.from_estimator`.
  warnings.warn(msg, category=FutureWarning)
```






True Positive Rate (Positive label: 1)
False Positive Rate (Positive label: 1)
SVC (AUC = 0.97)
0.0
0.2
0.4
0.6
0.8
1.0

In [ ]: