In [92]:
```
'''
Patrick Ballou
ID: 801130521
ECGR 4105
Homework 3
Problem 2
'''
```

Out[92]:
```
'\nPatrick Ballou\nID: 801130521\nECGR 4105\nHomework 3\nProblem 2\n'
```

In [93]:
```
import numpy as np
import warnings
warnings.filterwarnings("ignore")
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn import metrics
from sklearn.model_selection import train_test_split
from sklearn.datasets import load_breast_cancer
from sklearn import datasets
from sklearn.linear_model import LogisticRegression
from sklearn.preprocessing import MinMaxScaler, StandardScaler
from sklearn.metrics import PrecisionRecallDisplay
from sklearn.decomposition import PCA
```

In [94]:
```
breast = load_breast_cancer()
x = pd.DataFrame(breast['data'])
Y = pd.DataFrame(breast['target'])
```

In [95]:
```
#standard scaler is best here
scaler = StandardScaler()
#scaler = MinMaxScaler()
X = scaler.fit_transform(x)
```

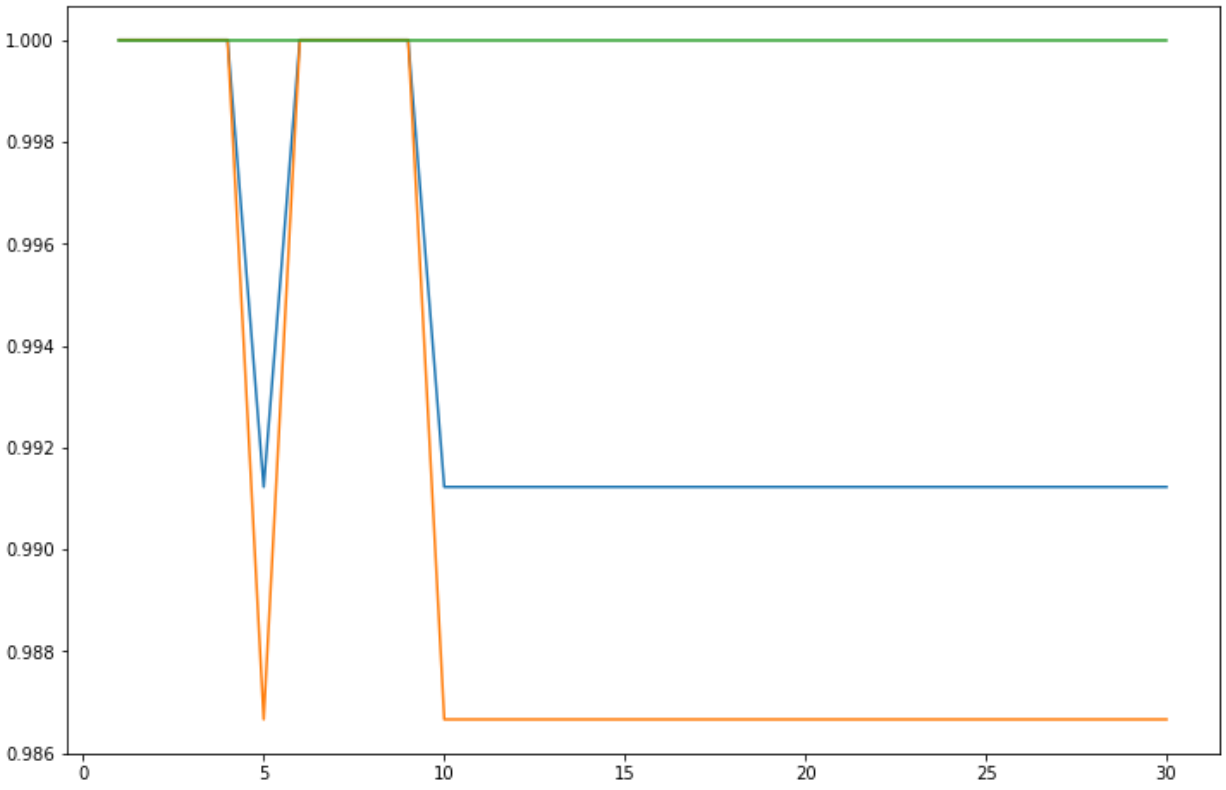
In [101…
```
metrics_history = {}
accuracy_history = list()
precision_history = list()
recall_history = list()
for pca_num in range(1, 31):
    pca = PCA(n_components=pca_num)
    principalComponents = pca.fit_transform(X)
    principalDf = pd.DataFrame(data = principalComponents)
    finalDf = pd.concat([principalDf, pd.DataFrame(breast['target'])], axis = 1)

    X_train, X_test, Y_train, Y_test = train_test_split(finalDf, Y, train_size=.8, tes

    classifier = LogisticRegression(random_state=7)
    classifier.fit(X_train, Y_train)
    Y_pred = classifier.predict(X_test)
    accuracy_history.append(metrics.accuracy_score(Y_test, Y_pred))
    precision_history.append(metrics.precision_score(Y_test, Y_pred))
    recall_history.append(metrics.recall_score(Y_test, Y_pred))
```

In [104…
```
plt.plot(range(1, 31), accuracy_history)
plt.plot(range(1, 31), precision_history)
plt.plot(range(1, 31), recall_history)
```

```
plt.rcParams["figure.figsize"] = (12,8)
plt.show()
```



In [ ]: