Observation:

The results show that with the eighth principal component, an accuracy as high as 92% can be achieved, and the confusion matrix reveals that some data points are still misclassified.

confusion matrix:

N=8	Class Rock(Predicted)	Class Mine(Predicted)
Class Rock(Actual)	26	3
Class Mine(Actual)	2	32

Conclusion:

Based on the analysis conducted, the maximum accuracy of 0.92 was achieved using 8 principal components. The confusion matrix at this point indicates that some data points are still misclassified, specifically 3 instances of actual rocks were incorrectly classified as mines, and 2 instances of actual mines were misclassified as rocks. The choice of 8 principal components was due to the model achieving its highest accuracy at this point, with further components introducing noise that reduced performance. The parameters for the MLPClassifier, including the three hidden layers with 150, 100, and 50 neurons respectively, were chosen to balance learning capacity and computational efficiency. The activation function 'tanh' was used for its capability to capture complex relationships, while 'adam' was selected as the optimizer for its adaptive learning rate. These parameters aimed to maximize accuracy while avoiding overfitting, and overall, the model demonstrated a good ability to distinguish between mines and rocks, improving the chances of navigating a real minefield safely.