رقم التسجيل: الاسم:

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Instructions: Time **10** minutes. Open book and notes exam. No electronics. Please answer all problems in the space provided and limit your answer to the space provided. No questions are allowed.

P1. The following Python code loads the features and labels of the MNIST dataset into train and test sets. Complete this code to reduce the features dimensionality from 784 to 100 using PCA, train a Perceptron neural network on the reduced training set, and evaluate the accuracy of the trained network on the test set.

[5 marks]

```python
from sklearn.datasets import fetch_openml
from sklearn.decomposition import PCA
from sklearn.linear_model import Perceptron
from sklearn.metrics import accuracy_score

mnist = fetch_openml('mnist_784', as_frame=False)

X_train, y_train = mnist.data[:60_000]/256, mnist.target[:60_000]
X_test, y_test = mnist.data[60_000:]/256, mnist.target[60_000:]
```

```python
pca = PCA(n_components=100)
X_train_reduced = pca.fit_transform(X_train)

per_clf = Perceptron()
per_clf.fit(X_train_reduced, y_train)

X_test_reduced = pca.transform(X_test)
y_pred = per_clf.predict(X_test_reduced)
accuracy = accuracy_score(y_test, y_pred)




print("Accuracy on the test set = ", accuracy)
```

<Good Luck>