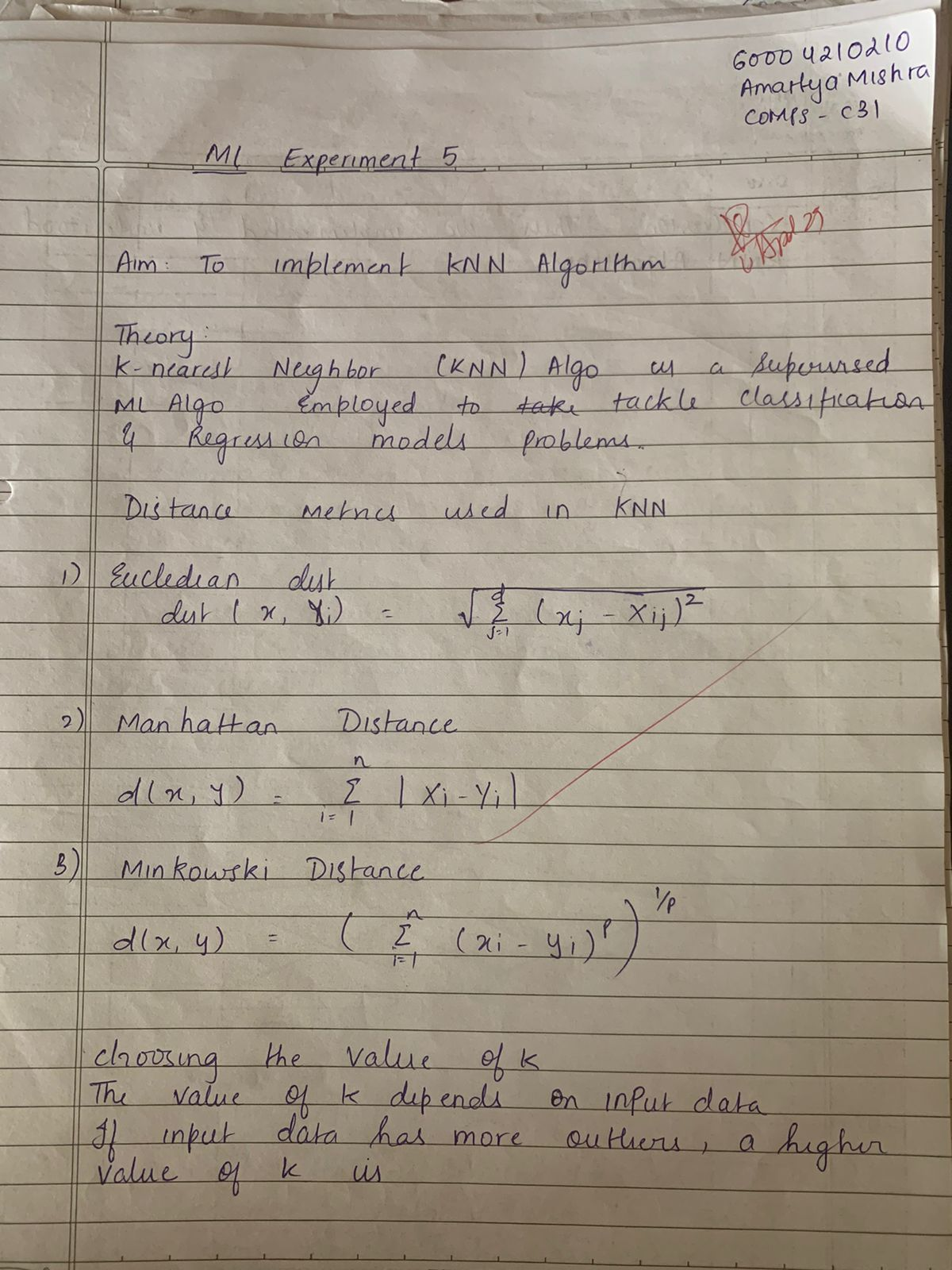
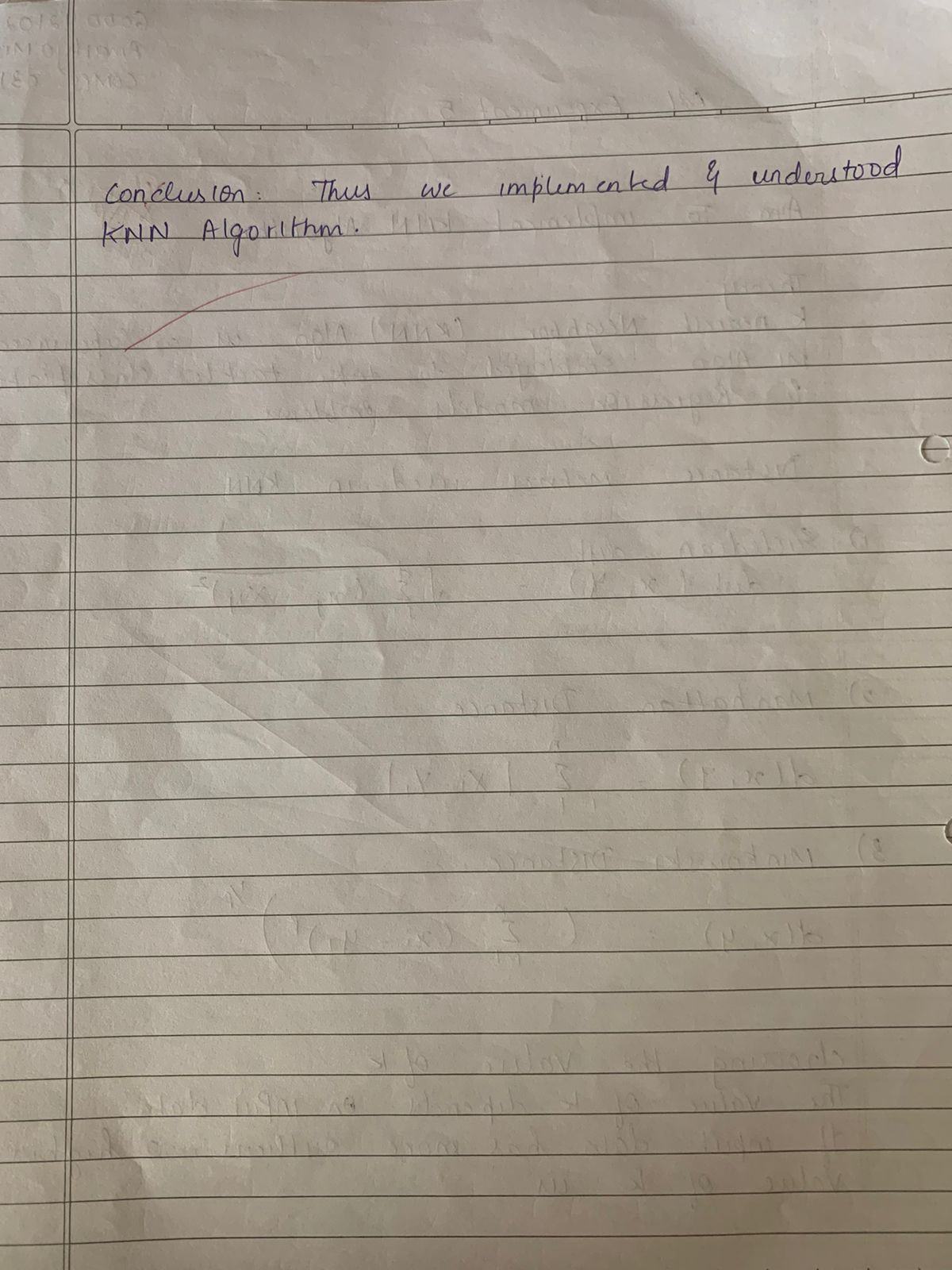
60004210210

Amartya Mishra

COMPS – C31

ML Experiment 5

****

****

**Implementation:**

import numpy as np

import matplotlib.pyplot as plt

import pandas as pd

from sklearn.datasets import load\_digits

from sklearn.decomposition import PCA

from sklearn.preprocessing import StandardScaler

digits\_data = load\_digits()

X = digits\_data.data

scaler = StandardScaler()

X\_scaled = scaler.fit\_transform(X)

pca = PCA()

X\_pca = pca.fit\_transform(X\_scaled)

eigenvalues = pca.explained\_variance\_

plt.figure(figsize=(10, 6))

plt.plot(range(1, len(eigenvalues) + 1), eigenvalues, marker='o', linestyle='-')

plt.title('Elbow Method for Optimal Number of Components')

plt.xlabel('Number of Components')

plt.ylabel('Eigenvalues (Explained Variance)')

plt.grid(True)

plt.show()

optimal\_num\_components = 10

X\_reduced = X\_pca[:, :optimal\_num\_components]

df\_reduced = pd.DataFrame(X\_reduced, columns=[f'PC{i}' for i in range(1, optimal\_num\_components + 1)])

df\_reduced['target'] = digits\_data.target

df\_reduced.to\_csv('reduced\_digits\_dataset.csv', index=False)

print("Digits Wine dataset saved successfully.")

****

