import pandas as pd

import numpy as np

data\_dict = {

'X': [1, 2, np.nan, 4, 5, np.nan, 7],

'Y': [np.nan, 2, 3, 4, np.nan, 6, 7],

'Z': ['foo', 'bar', 'baz', np.nan, 'qux', 'quux', 'corge'],

'W': [np.nan, np.nan, np.nan, np.nan, np.nan, np.nan, np.nan]

}

dataframe = pd.DataFrame(data\_dict)

print("Original DataFrame:")

print(dataframe)

missing\_data\_check = dataframe.isna()

print("\nMissing Data in DataFrame:")

print(missing\_data\_check)

dataframe\_dropna\_rows = dataframe.dropna()

print("\nDataFrame after dropping rows with any missing data:")

print(dataframe\_dropna\_rows)

dataframe\_dropna\_cols = dataframe.dropna(axis=1)

print("\nDataFrame after dropping columns with any missing data:")

print(dataframe\_dropna\_cols)

dataframe\_fillna = dataframe.fillna(value={'X': dataframe['X'].mean(), 'Y': dataframe['Y'].mean(), 'Z': 'missing', 'W': 0})

print("\nDataFrame after filling missing data:")

print(dataframe\_fillna)

dataframe\_with\_duplicates = dataframe.append(dataframe.iloc[2], ignore\_index=True)

print("\nDataFrame with Duplicates:")

print(dataframe\_with\_duplicates)

duplicates\_check = dataframe\_with\_duplicates.duplicated()

print("\nDuplicates in DataFrame:")

print(duplicates\_check)

dataframe\_no\_duplicates = dataframe\_with\_duplicates.drop\_duplicates()

print("\nDataFrame after removing duplicates:")

print(dataframe\_no\_duplicates)