Lagrange Interpolation.py

```python
#-------------------------------------------------------------------------------
# Name: Lagrange Interpolation
# Purpose: compute the value of the polynomial at given poit
#
# Author: Abdul Qadir Lonara
#
# Created: 9-02-2023
# Copyright: (c) Abdul Qadir Lonara 2023
# Licence: <your licence>
#-------------------------------------------------------------------------------
import math
#-------Input-------------
# creating an empty list
x = []
# number of elements as input
n = int(input("Enter number of elements : "))
print("Enter x cordinates : ")
# iterating till the range
for i in range(0, n):
ele = float(input("X"+str(i)+" : "))
x.append(ele) # adding the element
print(x)
y = []
print("Enter y cordinates : ")
# iterating till the range
for i in range(0, n):
ele = float(input("Y"+str(i)+" : "))
y.append(ele) # adding the element
print(y)
xi=float(input("Enter the value of the polynomial at which you want to comput : "))
"""
x (list): a list of x-coordinates of the data points
y (list): a list of y-coordinates of the data points
xi (float): the point at which to evaluate the polynomial
"""
yi = 0
for i in range(n):
```

```python
numerator = 1
denominator = 1
for j in range(n):
    if j != i:
        numerator *= xi - x[j]
        denominator *= x[i] - x[j]
yi += y[i] * numerator / denominator
print("at x = "+str(xi)+" f(x) = "+str(yi));
```

Output :-

Enter number of elements : 4

Enter x cordinates :

X0 : -1

X1 : 1

X2 : 4

X3 : 7

[-1.0, 1.0, 4.0, 7.0]

Enter y cordinates :

Y0 : -2

Y1 : 0

Y2 : 63

Y3 : 342

[-2.0, 0.0, 63.0, 342.0]

Enter the value of the polynomial at which you want to comput : 5

at x = 5.0 f(x) = 124.0