## **Lagrange Interpolation.py**

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# Name: Lagrange Interpolation

# Purpose: compute the value of the polynomial at given poit

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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):

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