import numpy as np

import matplotlib.pyplot as plt

def local\_regression(x0, X, Y, tau):

x0 = [1, x0]

X = [[1, i] for i in X]

X = np.asarray(X)

xw = (X.T) \* np.exp(np.sum((X - x0) \*\* 2, axis=1) / (-2 \* tau))

beta = np.linalg.pinv(xw @ X) @ xw @ Y @ x0

return beta

def draw(tau):

prediction = [local\_regression(x0, X, Y, tau) for x0 in domain]

plt.plot(X, Y, 'o', color='black')

plt.plot(domain, prediction, color='red')

plt.show()

X = np.linspace(-3, 3, num=1000)

domain = X

Y = np.log(np.abs(X \*\* 2 - 1) + .5)

draw(10)

draw(0.1)

draw(0.01)

draw(0.001)