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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)
    W=np.diag(np.exp(-np.sum((X-x0)**2,axis=1)/(2*tau*tau)))
    beta = np.linalg.pinv(X.T@ W @ X)@X.T@ W @Y
    y_pred=np.dot(beta,x0)
    return y_pred
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 = 100)
domain = X
Y = np.log(np.abs(X ** 2 - 1)+ .5)
print("X values:",X)
print("Y values:",Y)
print("\n Regression Line Fit for different values of Tau- 10,0.1,0.01,0.001")
draw(10)
draw(0.1)
draw(0.01)
draw(0.001)

```