IEOR 290A – Homework 2
Due Monday, April 21, 2014 in class

Suppose we make the following definitions:

$$\begin{aligned}
\xi &= \begin{bmatrix} \tilde{x} \\ \breve{u} \end{bmatrix} \\
X_i &= \begin{bmatrix} x_i \\ u_i \end{bmatrix} \\
\Xi_i &= h^{-2} \cdot \|\xi - X_i\|_2^2 \\
Y_i &= x_{i+1} - (Ax_i + Bu_i).
\end{aligned}$$

Then the L2NW estimator used as an oracle is given by

$$\mathcal{O}_n(\tilde{x}, \breve{u}) = \mathcal{O}_n(\xi) = \frac{\sum_{i=0}^{n-1} Y_i \cdot K(\Xi_i)}{\lambda + \sum_{i=0}^{n-1} K(\Xi_i)}.$$

Compute the gradient of this oracle, for the case $\lambda > 0$.