

Homework Due on April 23, 2015

1. Let D be the derivative operator. Find a quadratic function, $f : [0, 1] \rightarrow \mathbb{R}$ such that $\|f\|_\infty = 1$ and $\|D(f)\|_1 = 4$.
2. Show that \mathbb{R}^n is complete under $\|\vec{x}\|_2$, and hence \mathbb{R}^n is a Hilbert Space under the usual dot product.

3. Let:

$$A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \\ 0 & 1 \end{bmatrix}.$$

Find:

- (a) $\|A\|_{2,2}$
- (b) $\|A\|_{\infty,2}$
- (c) $\|A\|_{2,\infty}$