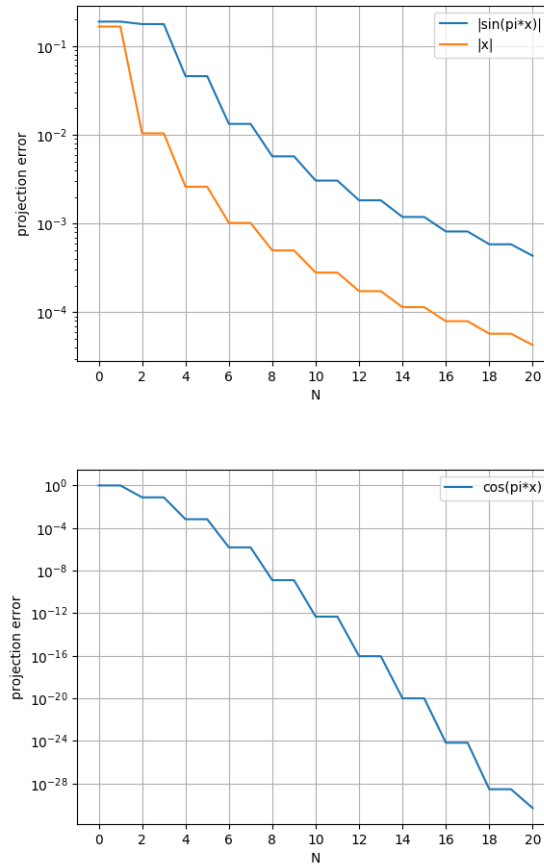# MATH:7830 Homework 2

Chuan Lu

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Figure 1: The projection error of $|\sin(\pi x)|, |x|, \cos(\pi x)$ with Legendre polynomials of degree up to 20.

We notice that

1. The projection error for $N = 2n$ and $N = 2n + 1$ are the same. This is because these three functions are even and consequently the inner product of ϕ_{2n+1} and f equals 0.

2. The smoother the function is, the faster the convergence is. This agrees with the bound of convergence rate.