

Homework 9

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Problem 1

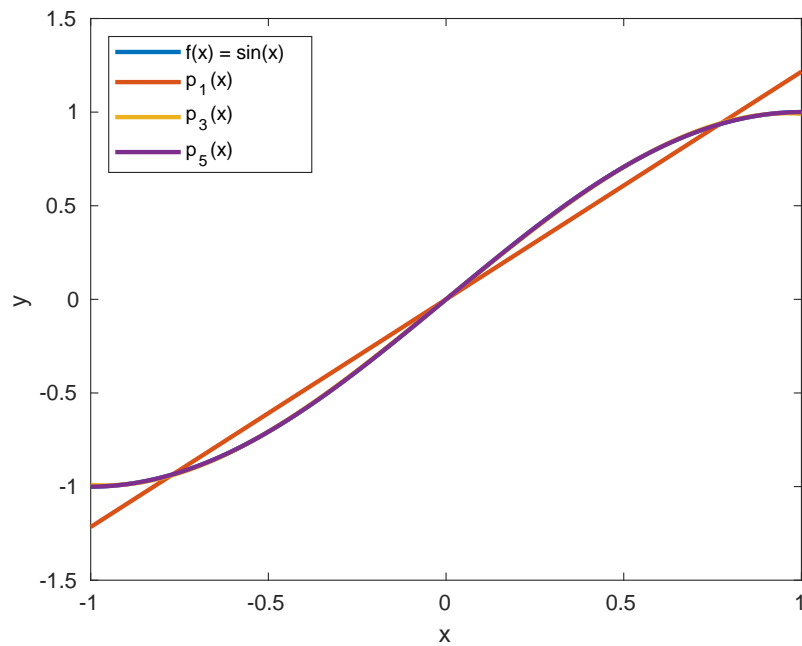


Figure 1: Approximation of $f(x) = \sin(\frac{\pi}{2}x)$ by by polynomials of various degree.

We plot only the approximations of odd degree, since f is odd on this interval so Legendre polynomials of even degree have inner product with f equal to 0 and do not contribute to the approximation. We can potentially see that successive polynomials approximate f to a greater and greater degree. This relationship is made more clear in the follow error plot.

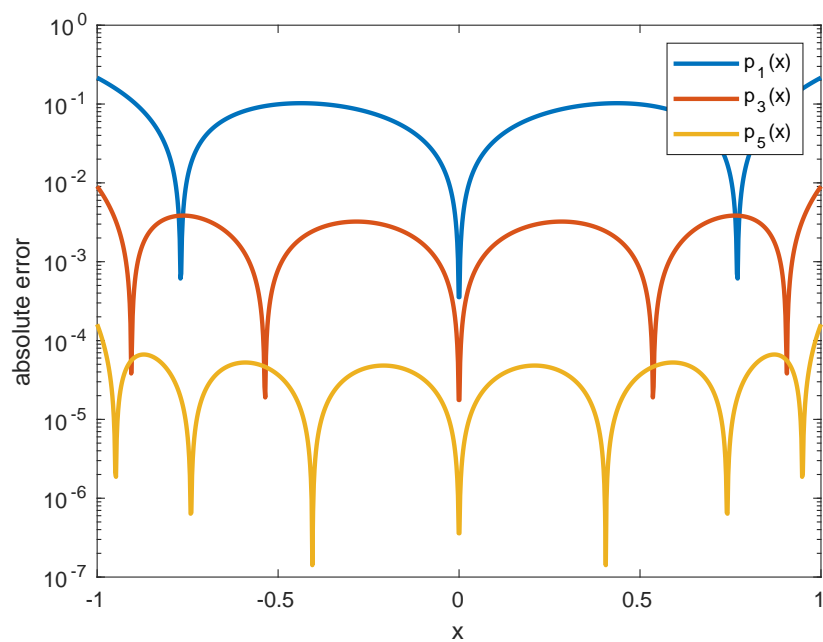


Figure 2: Absolute error between $f(x)$ and approximations by polynomials of various degree.

In the error plot, we can clearly see that the error is decreasing with increasing polynomial degree.