Math 2270–3
Project 2, part B
Inner Product Spaces

Create a Maple worksheet which includes your name(s), and answers the following questions:

1) Using the "dot1" inner product, find an orthonormal basis for P3 = span{1, t, t^2, t^3}. Notice that a lot of this work has already been carried out in the worksheet "2270innerproducts.mw.
2) Find the projection of f(t)=sin(t) onto P3, using dot1.
3) Compare the distance between sin(t) and its projection onto P3, to the distance between sin(t) and its degree three Taylor polynomial.
4) Display the three functions from (3) together in a single plot.
5) Using the "dot2" inner product, MAPLE, and pencil and paper if necessary, find the projection which is the degree 10 Fourier polynomial for the absolute value function f(t)=|t|. Hints: which of these coefficients must be zero? Also, Maple knows this functions as "abs(t)".
6) Create a display which shows the graph of f and of its Fourier polynomial, from #5.
7) Have MAPLE compute the derivative of your Fourier polynomial, and then plot this derivative function. Does this graph seem to be related to the graph of the derivative of the absolute value function? Explain/discuss.