Math 54 Quiz 8
April 10th, 2014

1. Consider the vector space $\mathbb{P}_2$ of degree 2 polynomials equipped with the inner product

$$\langle p, q \rangle = \int_0^1 p(x)q(x)dx$$

for degree 2 polynomials p, q. This vector space has a basis given by $1, x, x^2$, but this basis is not orthonormal with respect to the given inner product. Use Graham-Schmidt on this basis to produce an orthonormal basis.

2. Show that if a matrix A commutes with the projection onto a single vector v (ie. A commutes with the matrix vv^T) then v is an eigenvector of A. Hint: Consider A in an eigenbasis for the projection.