Math 54 quiz solutions October 30, 2009

1 *Define* eigenspace *(2.5 points).*

For a matrix A and λ an eigenvalue of A, the λ-*eigenspace* is the set of all vectors x such that $Ax = \lambda x$.

2 *Define what it means for a matrix to be* diagonalizable *(2.5 points).*

A matrix A is *diagonalizable* if and only if there exists a diagonal matrix D and an invertible matrix P such that $A = PDP^{-1}$.

3 *Define what it means for a quadratic form to be* indefinite *(2.5 points).*

A quadratic form $Q(x)$ is indefinite if it assumes both positive and negative values, i.e. $Q(x) < 0$ for some value of x and $Q(x) > 0$ for some other value of x.

4 *Define* orthogonal projection onto a subspace *(2.5 points).*

If L is a linear subspace of $\mathbb{R}^n$ and x a vector in $\mathbb{R}^n$, then the orthogonal projection of x onto L is the vector v such that $\|x - v\|$ is minimized. Equivalently, it is the vector v such that $x - v$ is orthogonal to every vector in L.