MATH 110 – SECOND PRACTICE MIDTERM

BENOIT DHERIN

(1) (a) Write out the definition of isomorphic vector spaces

(b) Prove that if the dimension of two finite-dimensional vector spaces is equal, then the two vector spaces are isomorphic

(2) (a) Write out the definition of an invariant subspace.

(b) Suppose that $T \in \mathcal{L}(V)$. Prove that if $U_1, \cdots, U_m$ are subspaces of V invariant under T, then $U_1 + \cdots + U_m$ is also invariant under T.

(3) Give an example of an operator whose matrix with respect to some basis contains only nonzero numbers on the diagonal, but the operator is not invertible.

Date: Wednesday, March 20th, 2013.