# Eigenvalues of projection matrices:

We know:

Let be an eigenvalue. Hence, where is an eigenvector.

Infact, . This is satisfied by

# Householder matrix eigenvalue:

Recall that is orthogonal and symmetric. Hence, .

Let be an eigenvalue and be the corresponding eigenvector.

However, since is a non-zero vector.

We can see that (simple multiplication), hence -1 is an eigenvalue.

for any perpendicular to (. Hence +1 is also an eigenvalue