Math 819 HW 3- Due Thursday November 12

1. Let \( \lambda = (3, 2) \) and consider the Specht module \( S^\lambda \) for \( \Sigma_5 \).
   a. Find the dimension of \( S^\lambda \).
   b. Determine the basis of standard polytabloids.
   c. Determine the matrices for the permutations \((1, 2)\) and \((1, 2, 3, 4, 5)\) in terms of this basis.
   d. Compute the Gram matrix for the usual bilinear form in terms of this basis.
   e. Compute the dimension of the simple module \( D^\lambda \) in characteristics 2 and 3 by determining the rank of the Gram matrix.
   f. Determine the weights of a G-Z basis of \( S^\lambda \) using residue sequences.

2. Page 65 # 3.
4. Page 83 #3
5. Look over Green’s Indecomposability Theorem and its proof on page 62.