Math 561 Fall 2013 Homework Number 5

Due Monday October 21, 2013

1. Prove the definition of the induced module given in the book in 5.8.1 gives an isomorphic module to that defined in class on Friday 10/11.

2. Consider the group given by $G := \langle x, y \mid x^7 = y^3 = 1, y^{-1}xy = x^2 \rangle$.

a) Prove that G has 21 elements and $H =< x >$ is a normal subgroup of order 7.

b) Determine the conjugacy classes in G.

c) Using characters lifted from G/H and others induced from H, construct the character table of G. Calculate the Frobenius-Schur indicator for each irreducible.

3. In the previous homework you worked out the tensor square $V \otimes V$ for each irreducible A_5 module. Now refine this to compute the multiplicities in the symmetric and exterior square of each irreducible A_5 module. Repeat for S_5.

4. Problem 5.11.1 c,d,e