Homework 3
due January 30, 2015 for presentation in class

1. Find a subgroup $H \leq S_n$ of the symmetric group and a set of tabloids $S$ such that $\mathbb{C}G/H \cong \mathbb{C}S \cong \mathbb{C}\{1, 2, \ldots, n\}$.

2. Let $X$ be an irreducible matrix representation of $G$. Show that if $g \in Z_G$ (the center of $G$), then $X(g) = cI$ for some scalar $c$.

3. Show that induction is transitive as follows. Suppose we have groups $G \geq H \geq K$ and a matrix representation $X$ of $K$. Then

$$X \uparrow^G_K \cong (X \uparrow^H_K) \uparrow^G_H.$$