• **Problem 1** [25 pts]
  Show that $S_2$ is not a normal subgroup of $S_3$. What happens if one tries to define multiplication of cosets in this case? Use examples to illustrate your conclusions.

• **Problem 2** [25 pts]
  In class we discussed a table which describes the conjugacy classes of $S_4$. Work out the a table for $S_5$ listing the cycle decomposition, typical group elements and number of group elements in each conjugacy class.

• **Problem 3** [25 pts]
  Show that there is only one group of order three, using a step-by-step procedure to construct the multiplication table. Can you identify which group this is?

• **Problem 4** [25 pts]
  How many conjugacy classes are there in $S_{141}$?