B. Show that the pair

$$\frac{1}{\sqrt{6}}(x_1 + x_2 - 2x_3), \tag{1}$$

$$\frac{1}{\sqrt{2}}(x_1 - x_2). \tag{2}$$

transform as the mixed 2-dimensional representation of S_3 by calculating the matrices that represent the transpositions P_{12}, P_{23}, and P_{31} and showing that they generate the 6×6 group table of S_3.

To save writing abbreviate P_{12}, etc., by (12). Use cycle notation. Multiply from left to right. The elements of the group table are (row)(column). Work from left to right in each cycle.