

Since the three irreducible complex representations of  $G = S_3$  can be defined over  $\mathbb{Q}$ , we know that  $\mathbb{Q}$  is a splitting field for  $G$ . The dimension equation  $|G| = \sum \chi_i(1)^2$  here is  $6 = 1^2 + 1^2 + 2^2$ , so we have  $\mathbb{Q}G \sim \mathbb{Q} \times \mathbb{Q} \times M_2(\mathbb{Q})$ . The three central idempotents of  $\mathbb{Q}G$  giving such a decomposition can be computed from the character table of  $S_3$ . They are:

$$e_1 = \{ (1) + (123) + (132) + (12) + (23) + (13) \} / 6,$$

$$e_2 = \{ (1) + (123) + (132) - (12) - (23) - (13) \} / 6,$$

$$e_3 = 1 - e_1 - e_2 = (1) * 2/3 - (123)/3 - (132)/3.$$