Physics 129C, Spring 2002

Problem Set 1

Date assigned: April 18 **Due on April 25 at 1:00pm**

Announcement: There will be a make-up class on April 22 and 29, 4:30 - 5:30.

Bring the homework to 422 Downs, attn: Takuya Okuda and Xinkai Wu.

[1] Suppose that, for any element g of a group G, we have a relation $g^2 = e$. Show that G is an Abelian group, *i.e.* $g_1 g_2 = g_2 g_1$ for any pair of elements $g_1, g_2 \in G$.

[2] Show that the symmetric group S_3 is generated by $\sigma = (1\ 2\ 3)$ and $\tau = (1\ 2)$, and the fundamental relations of $\sigma,\ \tau$ are $\sigma^3 = e,\ \tau^2 = e,\ (\tau\sigma)^2 = e$.

[3] Show that $V = \{e,\ (1\ 2)(3\ 4),\ (1\ 3)(2\ 4),\ (1\ 4)(2\ 3)\}$ is a normal subgroup of the symmetric group S_3 and that $S_4/V \simeq S_3$, where $\simeq$ means "isomorphic to."

[4] Prove that $G = H_1 \otimes H_2$ impiles $G/H_1 \simeq H_2$ and $G/H_2 \simeq H_1$. (Problem 2.7 of Tung)