Math 71 Homework Due November 7th

1. Prove that a group of order 48 must have a normal subgroup of order 8 or 16. You may want to prove the following preliminary results.

   (a) If G has more than one Sylow 2-subgroup and if H and K are distinct Sylow 2-subgroups, show that $|H \cap K| = 8$.

   (b) With H and K as in part (a), show that both N and K belong to $N_G(H \cap K)$.

   (c) Conclude that $G = N_G(H \cap K)$.