The original problem is below. The number of ways to hand out the gifts is the same as the number of permutations on eight objects with no fixed points. These are called derangements. There are several ways to count them. We will use a method called inclusion/exclusion. We start by counting all permutations which gives 8!. Now this cannot be right because we counted distributions where people received their own gifts so we must subtract the number of ways 1 person can receive their own gift. We choose 1 of the 8 people to get their own which leaves 7! ways to distribute the other gifts. Thus we must subtract 8 x 7!. Now in some of these possibilities two people received their own gift but we subtracted these cases twice (once for each person) so we must add these back in. There are 8x7/2 =28 ways to choose 2 people and 6! ways to arrange the other gifts so we must add 28 x 6!. Continuing this analysis gives

$8! - \binom{8}{1}7! + \binom{8}{2}6! - \binom{8}{3}5! + \binom{8}{4}4! - \binom{8}{5}3! + \binom{8}{6}2! - \binom{8}{7}1! + \binom{8}{8}0!$ = 14833.

Not Mine

8 classmates are having a gift exchange. Each person brings a gift and then they are randomly handed out to the participants. The only restriction is that a person cannot receive the gift they brought. How many ways can the gifts be distributed?