

## Lesson 14

### EQUIVALENCE RELATIONS – PRACTICE

Let  $X = \{1, 2, 3, 4\}$  and let

$C_2 \times C_2 \times C_2 = \{(), (1, 2), (3, 4), (5, 6), (1, 2)(3, 4), (1, 2)(5, 6), (3, 4)(5, 6), (1, 2)(3, 4)(5, 6)\}$ . Each problem below defines an equivalence relation on either  $X$  or  $C_2 \times C_2 \times C_2$ . Find the corresponding equivalence classes.

1. Find the orbits on  $X$  created by  $C_2 \times C_2 \times C_2$ .
2. Partition  $C_2 \times C_2 \times C_2$  into those permutations that fix 1 and those that don't.
3. Find the conjugacy classes in  $C_2 \times C_2 \times C_2$ .
4. **BONUS PROBLEM:** If  $X = \{1, 2, 3, 4\}$  and  $D_4 = \{(), (1, 3), (2, 4), (1, 3)(2, 4), (1, 2)(3, 4), (1, 4)(2, 3), (1, 2, 3, 4), (1, 4, 3, 2)\}$ , find the five conjugacy classes in  $D_4$ .