UW Math Circle

March 10, 2016

Homework

1. Find permutations so that

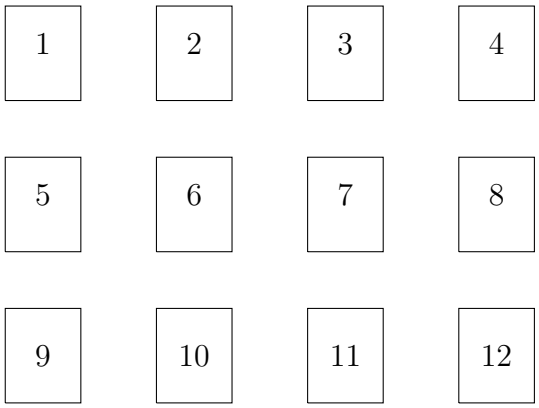
$$54321 \cdot \_\_\_\_\_ = 12345$$

$$\_\_\_\_\_ \cdot 54321 = 12345$$

2. Write the permutations in problem 1 in **cycle notation**.

3. How many permutations of length 5 have a cycle of length at least 3?

4. Start with a deck of 12 cards numbered one through twelve. Now deal them out into a 3×4 grid by laying them out along the rows from top to bottom:



Finally, collect the cards column-by-column from left to right. So now the top three cards on the deck are 1,5,9, followed by 2,6,10, and so on. How many times will you have to repeat this process before the cards are back in their original order?