Worksheet 7: Introduction to the Symmetric Group
Math 335

Reporter:

Recorder:

Equity Manager:

1. How many bijections from the set $\{1, 2, 3\}$ to itself can you think of? For example, we've seen one:

$$f(1) = 3$$
$$f(2) = 1$$
$$f(3) = 2.$$

Try to list as many others as you can.

2. How many different bijections do you think there are from the set $\{1, 2, 3\}$ to itself?

3. It's cumbersome to have to write $f(1) = \cdots , f(2) = \cdots , f(3) = \cdots$ every time we want to specify a bijection. Brainstorm with your group members some possible short-hand notations for this.

4. At the end of today's video, I mentioned the following theorem:

Theorem: The set

$$S_n = \left\{ \text{bijections from the set } \{1, 2, \ldots, n\} \text{ to itself} \right\}$$

forms a group under the operation of composition.

What things do we need to check in order to prove this theorem? Some of those things are problems on Homework 3; do you see which ones?