

Homework 9.

Due Wed. Nov 13, 2013.

Problem 1

Draw the diagrams (as we did in class) for all bijections from A to A when

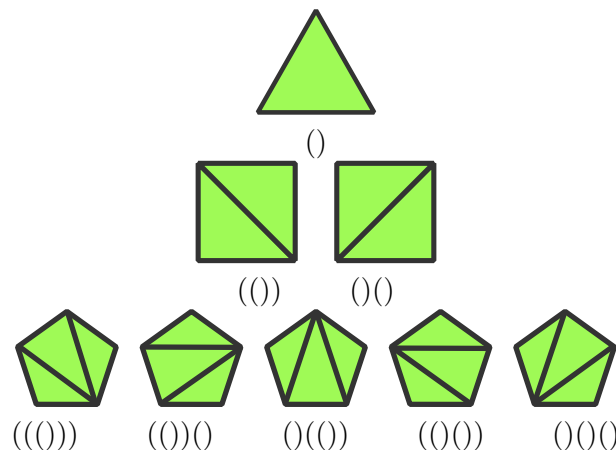
- (a) $A = \{1\}$
- (b) $A = \{1, 2\}$
- (c) $A = \{1, 2, 3\}$
- (d) For this question, either repeat the task for $A = \{1, 2, 3, 4\}$, or derive a formula for the total number of bijections from A to A , when $|A| = n$.

Problem 2

Find a bijection between the following two sets

- (a) the strings of n pairs of correctly matching parentheses and
- (b) the triangulations of convex polygons with $n + 2$ vertices.

Example bijection (one of many possible) for $n = 1$, $n = 2$, and $n = 3$:



Problem 3

We know that by definition, the ordered pair (x, y) should satisfy the following property:

$$(a, b) = (c, d) \quad \text{if and only if} \quad (a = c) \wedge (b = d).$$

That is, two pairs are equal if and only if they have equal corresponding components.

You are given two possible ways to define an ordered pair of x and y using sets:

(a) $(x, y) = \{x, y\}$

(b) $(x, y) = \{\{x\}, \{x, y\}\}$

Check if each of these definitions satisfies that pair correctness property.

Remember that two sets are equal iff they have the same elements.