S16 Exam 2 Problem 1 Combinatorics, Dave Bayer



Test 1

Name	Uni	

[1] Give a proof of Burnside's Lemma: If a group G acts on a set of patterns X, then the number of distinct patterns up to symmetry is equal to the average number of patterns fixed by an element of the group:

$\frac{1}{|G|}\sum_{g\in G}|X^g|$

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Test 1

[2] How many ways can three checkers be placed on a 3 \times 3 checkerboard, up to symmetry? Consider both rotations and flips.

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Test 1

[3] Up to rotational symmetry, how many ways can we color the four faces of a tetrahedron, using at most two colors?



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Test 1

[4] Up to rotational symmetry, how many ways can we choose three of the twelve edges of a cube?



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Test 1

[5] Up to symmetry, how many ways can the beads of a seven bead necklace be colored, using exactly three colors? Consider only rotations, and use all three colors.

