

## HOMEWORK #1

Instructor: Yanxi LIU ([yanxi@cse.psu.edu](mailto:yanxi@cse.psu.edu))

Office Location 338B IST

Office Hours: after each class and by appointments

Fall 2006 CSE 598B, Three Credits

September 13, 2006, Due date: September 20.

### Problem #1:

Do the following two subsets,  $S_1, S_2$ , of the 3D Euclidean space  $\mathbb{R}^3$  have the same symmetry group?

1.1  $S_1$  = three isolated vertices of a regular triangle

1.2  $S_2$  = the same triangular-shaped 2D plate (including all internal points)?

2.1  $S_1$  = an infinitely long cylindrical surface with radius  $r$

2.2  $S_2$  = the central axis of  $S_1$

3.1  $S_1$  = equally placed points along two orthogonal axes in 2D space

3.2  $S_2$  = a black and white square-shaped checkerboard

### Problem #2:

How many different ways to put a cube in a corner? And why?

### Problem #3:

Look for one recent paper (in the past five years) on the topic of "computational symmetry" in your area of interest (not written by one of us and not on our course reference list). Each paper should either report work on developing computer algorithms to find relevant symmetry/symmetry group, or use symmetry concept for other computer-aided applications. Bring to class a hard/soft copy of each paper and hand in a short written summary of each paper.

### Problems #4:

Upload 10 digital photos of your choice to the CMU Near-Regular Texture Database

<http://graphics.cs.cmu.edu/data/texturedb/gallery/>

go to "Submit Your Textures", then select "add photos" under album actions, you do not need to login.