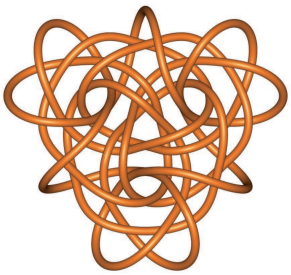
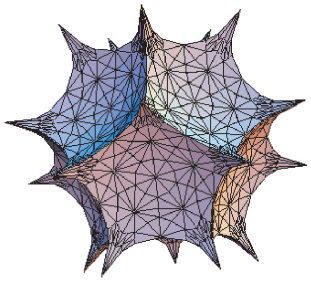


Willamette Math Problem of the Week



March 10 2008
Water into Wine

A cup of wine is suspended over a second cup of equal capacity full of water. Through a small hole in the bottom, the wine drips into the water, and the mixture again drips out of a small hole in the lower glass at the same rate. When the wine cup is completely empty, what part of the content of the lower cup is water? Assume that the wine and water mix completely and instantly.

Submit all solutions before the appearance of the next problem to Josh Laison in person, by e-mail (jlaison@willamette.edu), or by bike messenger. The first correct solution gets a prize; all correct solutions get fame and glory. Preference for the prize goes to problem-solvers who haven't won one yet.

Solution to *Which Weight Weighs Which Weight?*:
Label the stones R1, R2, Y1, Y2, B1, and B2. In the first weighing, weigh R1 and Y1 on the left side of the scale against B1 and Y2 on the right side. There are three possible outcomes, and depending on the outcome of this weighing, we do three different things:

1. If the left side is lighter, then weigh R1 and B1 on the left against R2 and B2 on the right (and note Y1 < Y2).

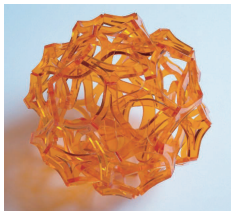
   If the left is lighter, R1 < R2 and B1 < B2. If the right is lighter, R1 > R2 and B1 > B2. If the scale balances, R1 < R2 and B1 > B2.

2. If the right side is lighter, then weigh R1 and B1 against R2 and B2 (and note Y1 > Y2).

   If the left side is lighter, R1 < R2 and B1 < B2. If the right side is lighter, R1 > R2 and B1 > B2. If the scale balances, R1 > R2 and B1 < B2.

3. If the scale balances, weigh R1 against Y1.

   If the left side is lighter, R1 < R2, B1 > B2, and Y1 > Y2. If the right side is lighter, R1 > R2, B1 < B2, and Y1 < Y2. In this case, it's not possible for the scale to balance.



Past problems of the week, solutions, and solvers can be found at http://www.willamette.edu/~jlaison/problem.html