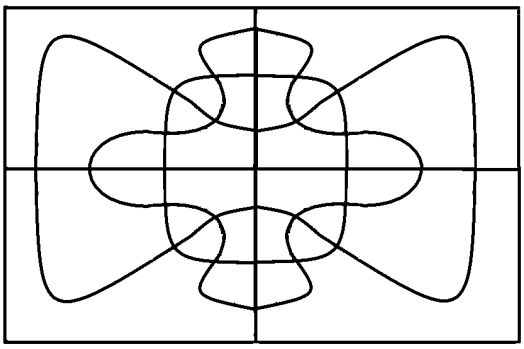
Huddle 2009

1. Find two integers greater than 1 whose product is 101010101.

2. Suppose you are required to color all of the regions in the figure below in such a way that no two regions which meet at more than a single point get the same color. What is the least number of colors you could use?



3. If $r > 0$ and $r^3 - 6r = 4$, evaluate $r^2 - 2r$.

4. Three small circles, each of radius 1, lie inside a larger semicircle. Each small circle is tangent to the diameter of the large semicircle. The two outer small circles are each tangent to the semicircle, and the inner small circle is tangent to the other two. What is the radius of the large semicircle?