Challenge Problem 1

How many colors are needed to color a plane in such a way that no two points which are 1 unit apart receive the same color?

(Imagine the plane as being a piece of paper that extends forever in each direction. To color this we must assign exactly one color to each point on the paper. As long as we fix the unit length it does not matter what this length actually is. We want to know the smallest number of colors we can use—and which points to assign to each color—so that when we pick any pair of points in the colored plane which are exactly one unit apart, they have different colors.)

Easier problem: Same problem, but color a straight line in this way instead of a plane.

Harder(!) problem: Same problem, but “color” 3-dimensional space in this way instead of a plane.

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