WHAT IS   GEOMETRIC ART AND WHAT ARE THE BASIC ELEMENTS USED IN ITS CREATION
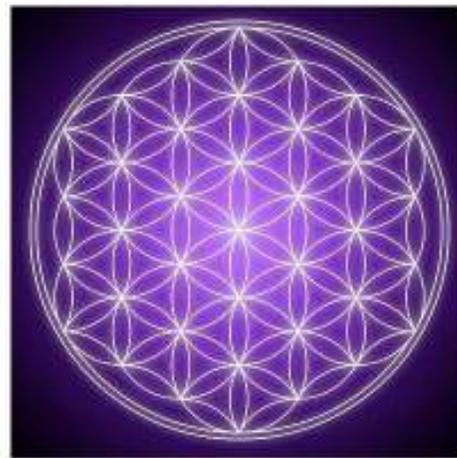
During the late middle ages and early Renaissance a philosophy-religion was revived in Europe based on earlier Egyptian and Greek beliefs and concepts. Termed Hermetism after the Greek god Hermes it maintains that man is potentially devine through the power of his intellect. Early European followers were John Dees(1527-1608) of England and Giordano Bruno(1548-600) of Italy followed later, among others, by Spinoza and Goethe. Offsprings and predecessors of this philosophy include Roscrucians, Kabbal followers, and Free-Masons. Of interest to us here is the type of art and symbolism engendered by this movement. In particular we refer to the publications of the polymath Giodarno Bruno who employed simple geometric figures to aid practitioners in reaching enlightenment. Considered a heretic by the Roman church he later paid for his views by being burned at the stake. Among his prophetic views were that the universe is filled with an infinite number of other civilizations and that the sun is not the center of the universe, as Copernicus had suggested, but rather just a star among an infinite number of other stars. In his 1588 book "Articuli centum et sexaginta adversus hutus tempestatir atque philosopos" Bruno, a Dominican friar who was also a mathematician, philosopher, and astronomer , presented some geometric drawings based on the superposition of simple geometric figures. One of the most interesting of these is the following-

It is referred to as the Figura Amoris and consists of interlocking squares, circles, and straight lines Although Bruno ascribed esoteric religious meanings to this figure (similar to what Bernoulli (the elder) did with his logarithmic spiral a century later) , the image presents a pleasant appearance in its own right regardless of any dubious spiritual meanings. Since that time thousands of other figures of this type involving symmetric designs based upon a limited number of overlapping geometric figures have been created throughout the world. We will refer to these and related figures as Geometric Art. In the literature this art form is sometimes also referred to as Sacred Geometry. Such art includes the Mandalas of Buddhist religion, the Flower of Life known already to the ancient Egyptians, the Metatron of some new age religions, and the obviously man-made Crop Circles. Below I show an example of each of these art forms as can be found at Google Images-
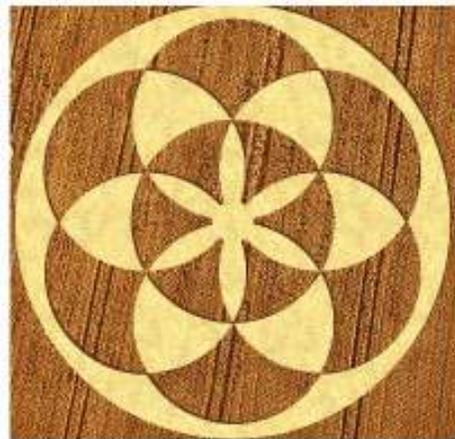

Mandala

Flower of Life
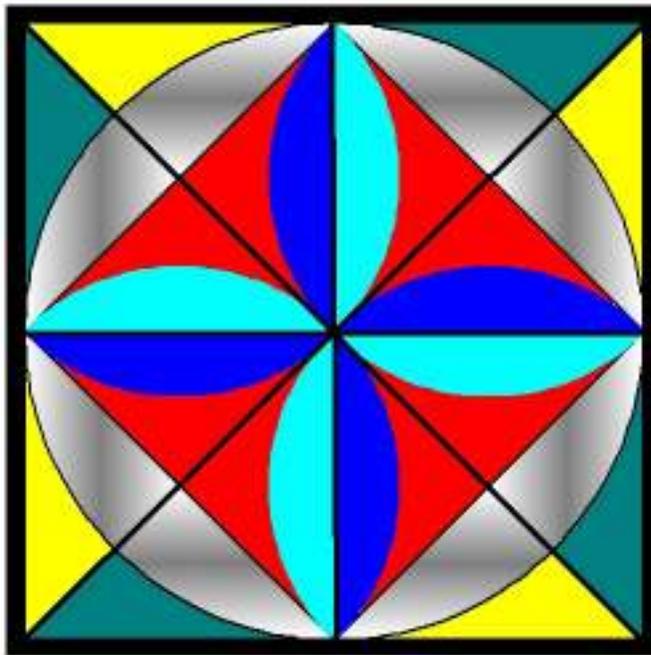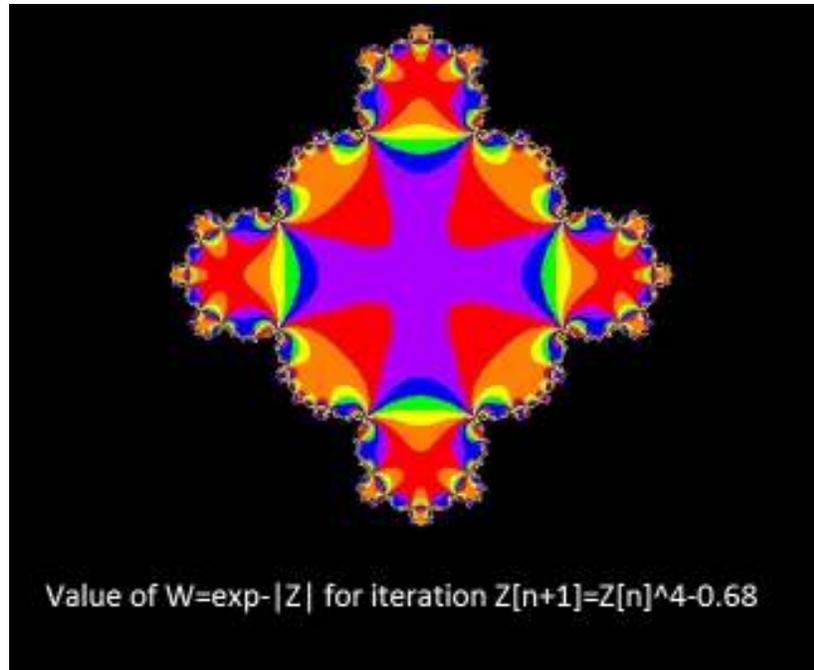

Metatron

Crop Circle

In analyzing Bruno's Figura Amoris plus these other samples it becomes clear that Geometric Art consists essentially of figures constructed from simple geometrical shapes and all exhibiting various degrees of rotational symmetry. Colors and shading are added to offer additional dimensions. The symmetric tile work of Islamic artists(such as found in the Topkapi palace in Istanbul) and some paintings by modern artists(including Mondrian, Albers, and Malevich) also fall into this category .The construction follows simple rules and is thus amenable to computer graphics as we will demonstrate next.

Let us see what can be done with four straight lines , eight circular caps , a full circle, and two squares . Using our MAPLE computer program in conjunction with the Image Forge paint program one can create the following-
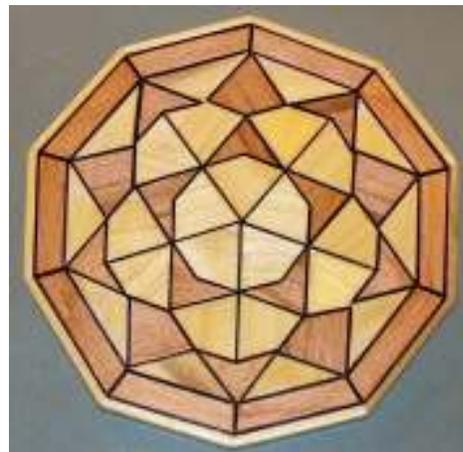

The picture has a four-fold rotational symmetry and shows some resemblance to both the Amoris figure and the Flower of Life figure shown above. In principle it is possible to construct an infinite number of other geometric figures which can be categorized as belonging to the class of Geometric Art. This includes many signs, symbols, national flags, the foundation outlines of churches, mosques and many other buildings including sports stadiums and museums.

It is also possible to take the artist completely out of the picture by generating designs directly by mathematical iterations. Good examples of such are patterns like the Mandelbrot set in fractal geometry. Here is an example of geometric art with four fold symmetry we constructed using the iteration $Z[n+1]=Z[n]^4-0.68$ -

Value of W=exp-|Z| for iteration Z[n+1]=Z[n]^4-0.68

Several years ago I constructed in my woodshop several different symmetric designs which can be included in the Geometric Art category. Here are two examples

The first exhibits a four-fold rotational symmetry while the second has five-fold symmetry. The first figure represents a wood collage in which simple geometrical shapes are glued onto a flat wood base. The second is an oak-poplar wood inlay based on Penrose tilling. Its main elements are identical oblique triangles joined at a common side. Our latest wood inlay just completed yesterday is a variation on the Flower of Life as shown above. Here is a photo of the four-fold rotationally symmetric figure-

The appeal of the type of Geometric Art and Designs discussed above clearly follows from the simplicity of the figures making it possible for a person to readily read his own interests and aspirations into it. In its most elementary form Geometric Art reduces to symbolism which can encourage religious and nationalistic fervor. Think of the Christian Cross, the Jin and Jang of Taoism, the Swastika, the Hammer and Sickle, the Peace Symbol, the Rising Sun Flag, and the Crescent Moon and Star of Islam. Interesting reading concerning man's subconscious response to symbols can be found in Karl Jung's book on "Man and His Symbols".

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