Representing Polygons Through the Roots of Unity

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This project investigates the representation of polygons through the roots of unity. Since the points in the complex graph of power functions lead to equidistant solutions, they can then be connected to form both regular and irregular polygons. The project derives formulas for the resulting vertices, apothem length, and area. Distinct methods are utilized for calculating the areas of the figures created. Through them, a relationship between trigonometric functions and summation functions is found. The initial idea of roots of unity in two dimensions is extended to three dimensions for further insight into the higher dimensional polyhedra. This representation of polygons and polyhedra could have implications in the fields of computational geometry and computer graphics.

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