Problem of the week #12

Due November 29th

In 2D, figures may be constructed using the abstract tools of *compass* and *straightedge*. The compass allows one to draw a circle around any known center through any known point, and the straightedge allows one to draw a line between any two known points. Intersection points which arise from lines and circles automatically become known. Points may also be chosen arbitrarily in space or on a line or circle, but one cannot assume anything else about such points when choosing them.

In 3D, figures shall be constructed using *astrolabe* and *flatedge*. The astrolabe allows us to construct a sphere around any known center through a given point, and the flatedge allows us construct the plane through any three noncollinear points, or the line between any two.

Problem. Explain how to construct a regular icosahedron.

Hint: the icosahedron inscribes three orthogonal golden rectangles.

Partial credit available for constructing (a) three perpendicular lines through a known point or (b) a golden rectangle with a known center.

- Two weeks are given to submit a solution for this POW.
- Questions? Email: `bthorner@unomaha.edu`
- Submit solutions to (above email), DSC 210, or DSC 203.
- POWs, solutions, backgrounds, leaderboard available at

`https://www.unomaha.edu/college-of-arts-and-sciences/mathematics/student-opportunities/pow_solutions.php`