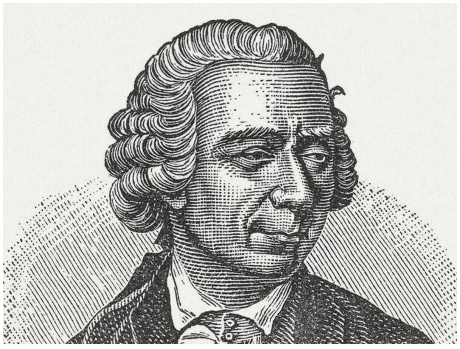
MATH CIRCLE TTU

Topology

Euler Characteristic



$$e^{i\pi}+1=0$$

Euler Characteristic χ

F: "Faces"

V: "Vertices (Corners)"

E: "Edges"

$$\chi = F + V - E$$

Planar Regions

Problem 1. Compute the Euler characteristic of the planar region enclosed by:

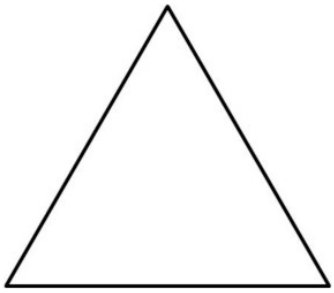
(i) A triangle.

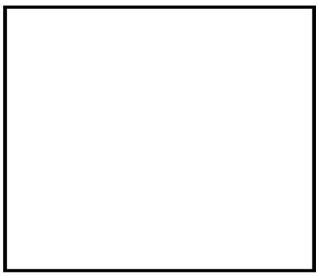
(ii) A rectangle.

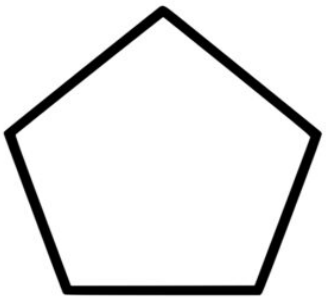
(iii) A pentagon.

(iv) Any polygon.

(v) A circle.







Polyhedra

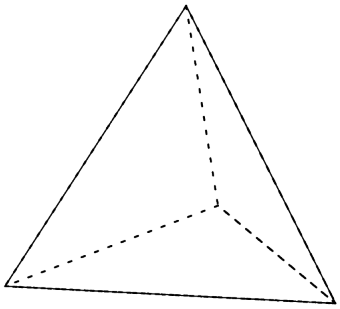
Problem 2. Compute the Euler characteristic of the following polyhedra:

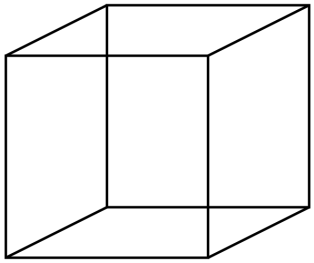
(i) A tetrahedron.

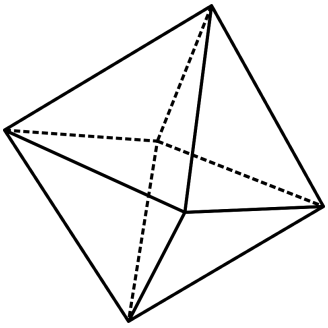
(ii) A cube (hexahedron).

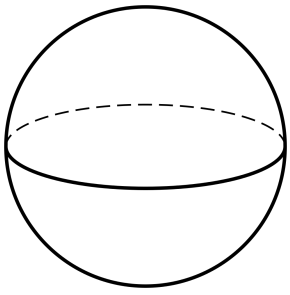
(iii) An octohedron.

(iv) A sphere.



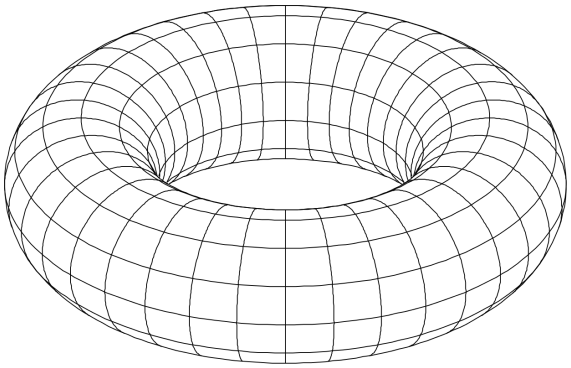






Closed Surfaces

Problem 3. Compute the Euler characteristic of a torus (donut).



The Mobius Strip

Problem 4. Compute the Euler characteristic of the Mobius strip.