Unit 3
Boundary Representation

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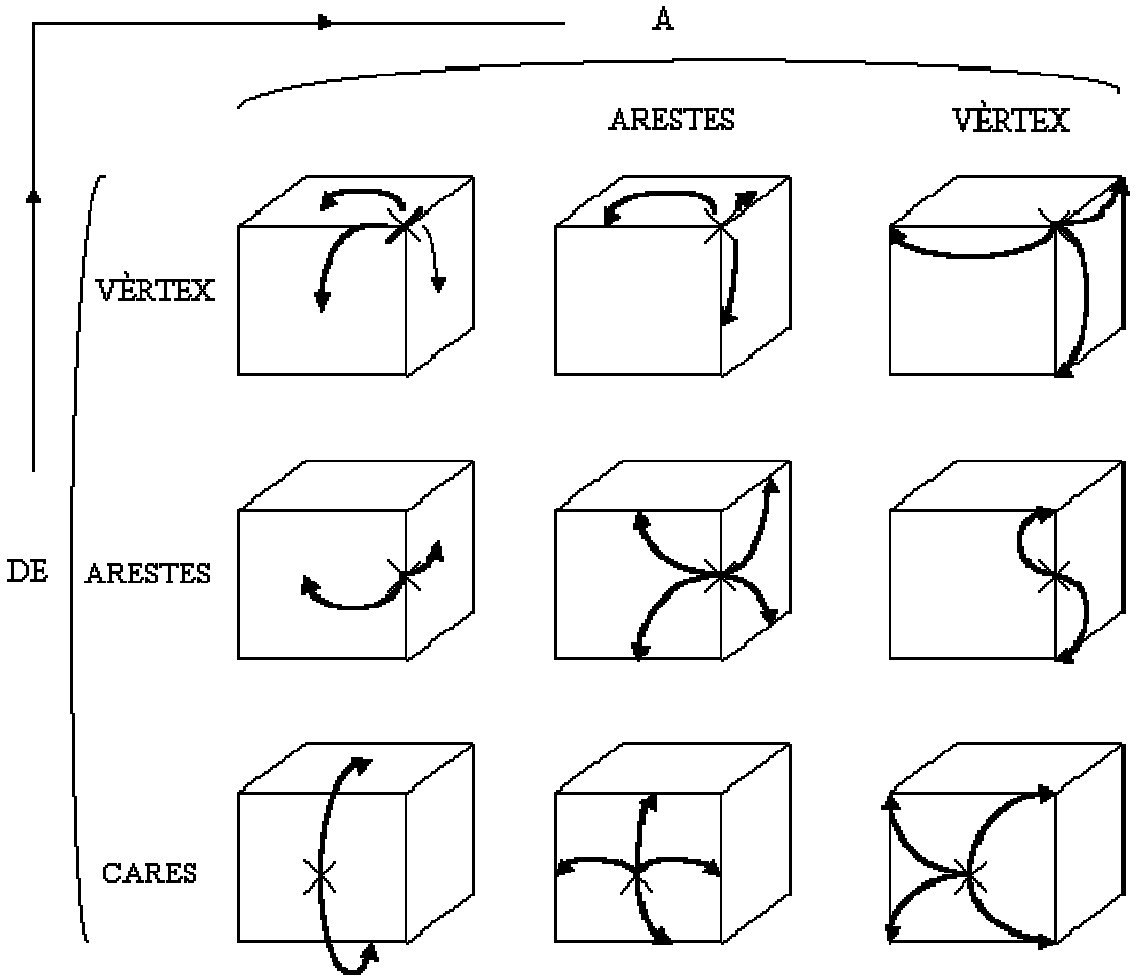
Topological information

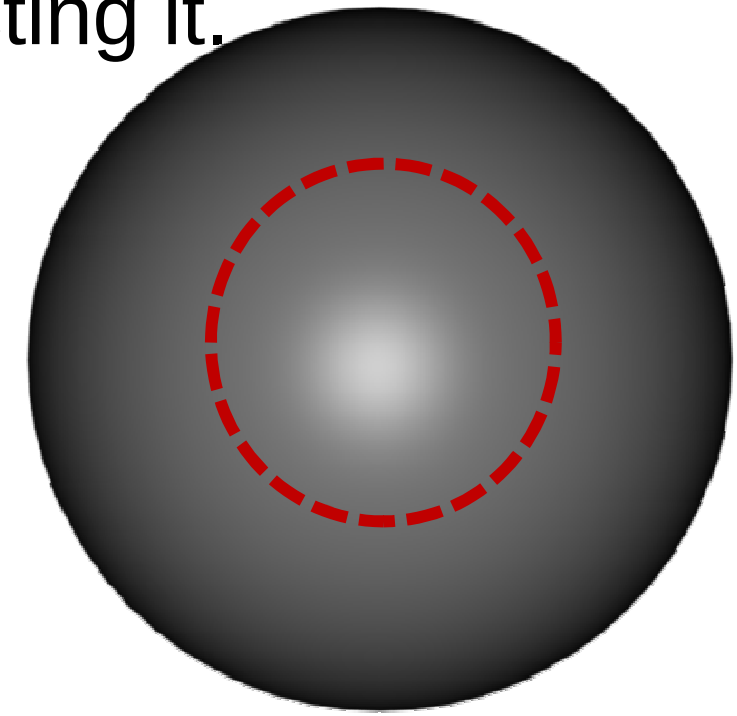
From \ To	**Face**	**Edge**	**Vertex**
Face	F: {F} 1:N	F: {E} 1:N	F: {V} 1:N
Edge	E: {F} 1:2	E: {E} 1:N	E: {V} 1:2
Vertex	V: {F} 1:N	V: {E} 1:N	V: {V} 1:N

Topological information

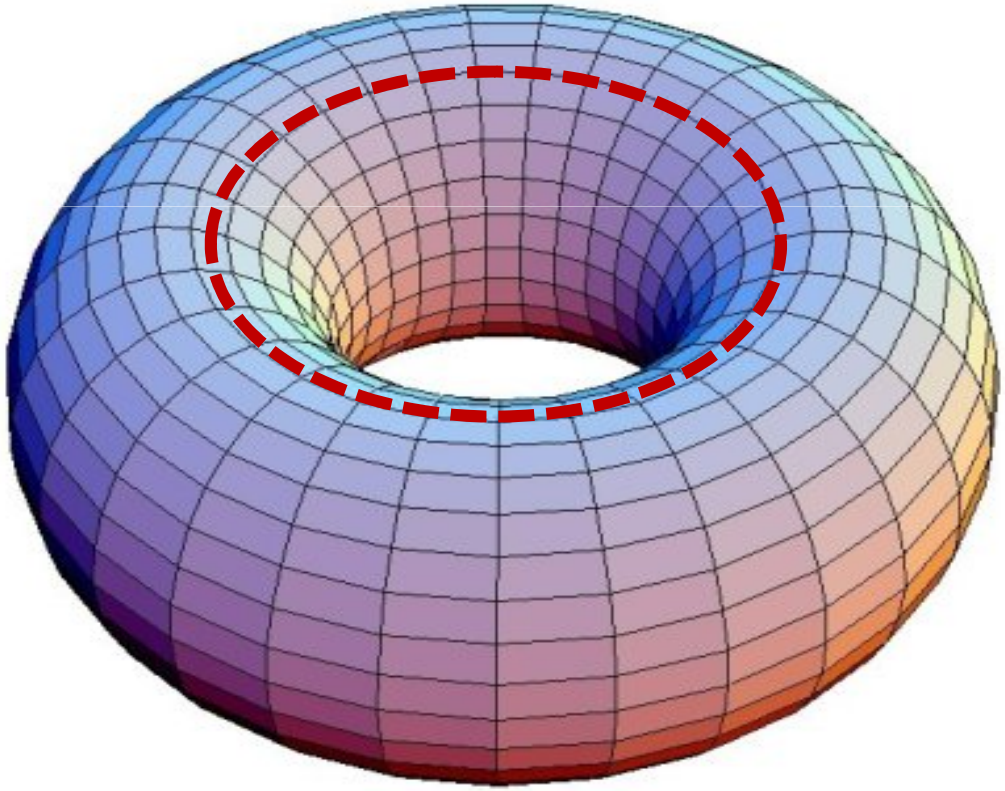


Genus (H, handles)

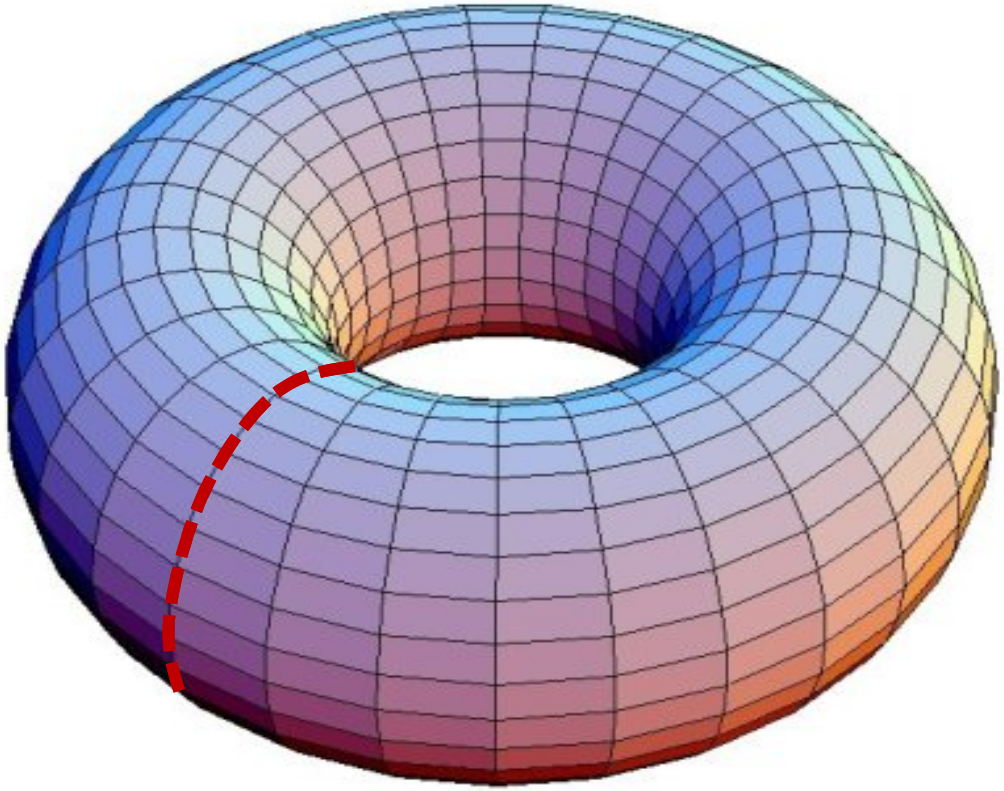
- Genus (of a surface) = maximum number of cuts (simple, closed, disjoint curves) that can be drawn on the surface without disconnecting it.

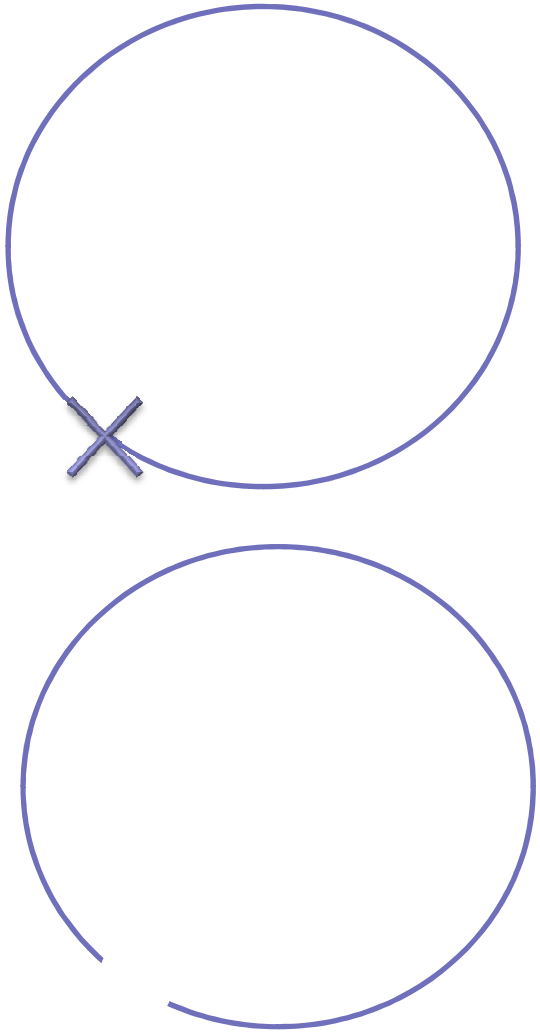


Genus 1

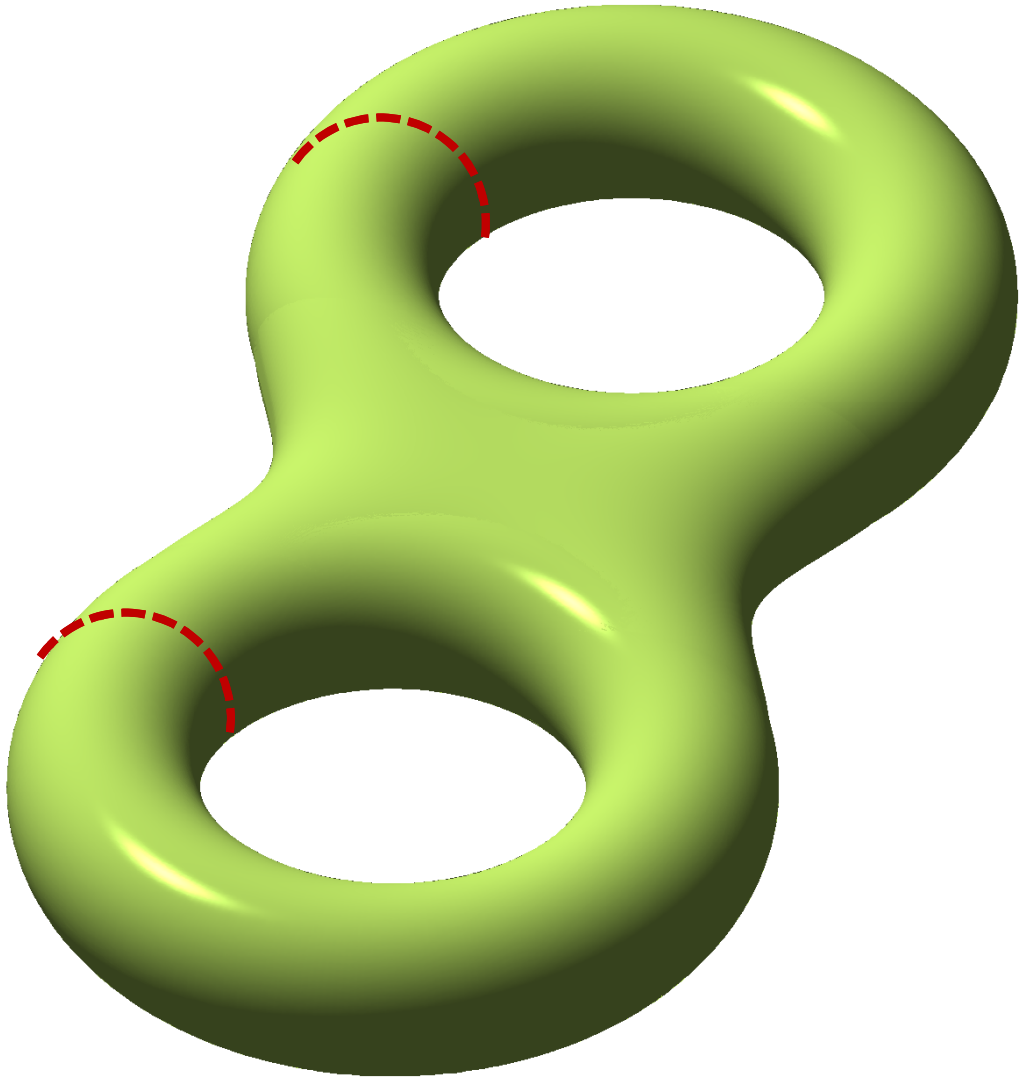


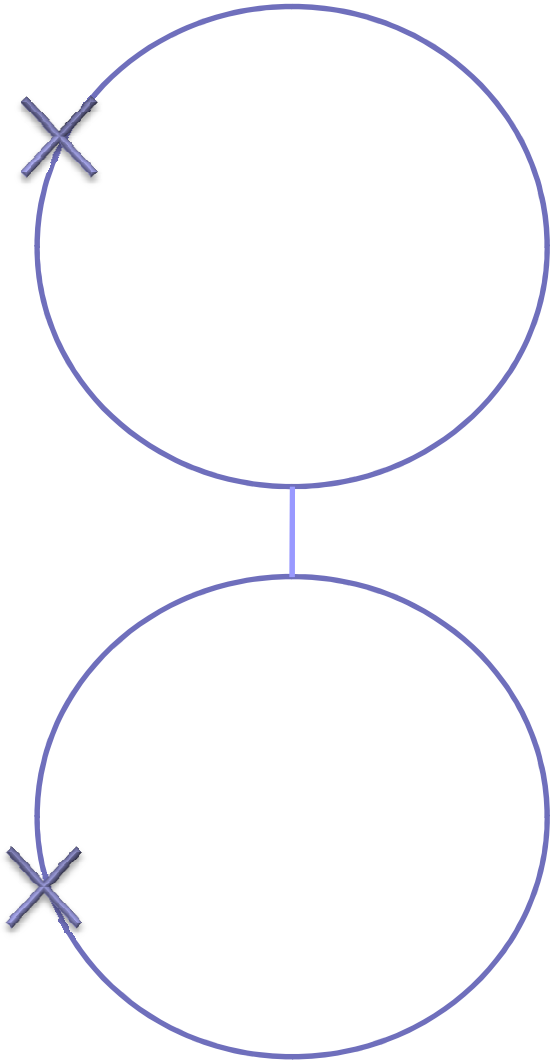
Genus 1



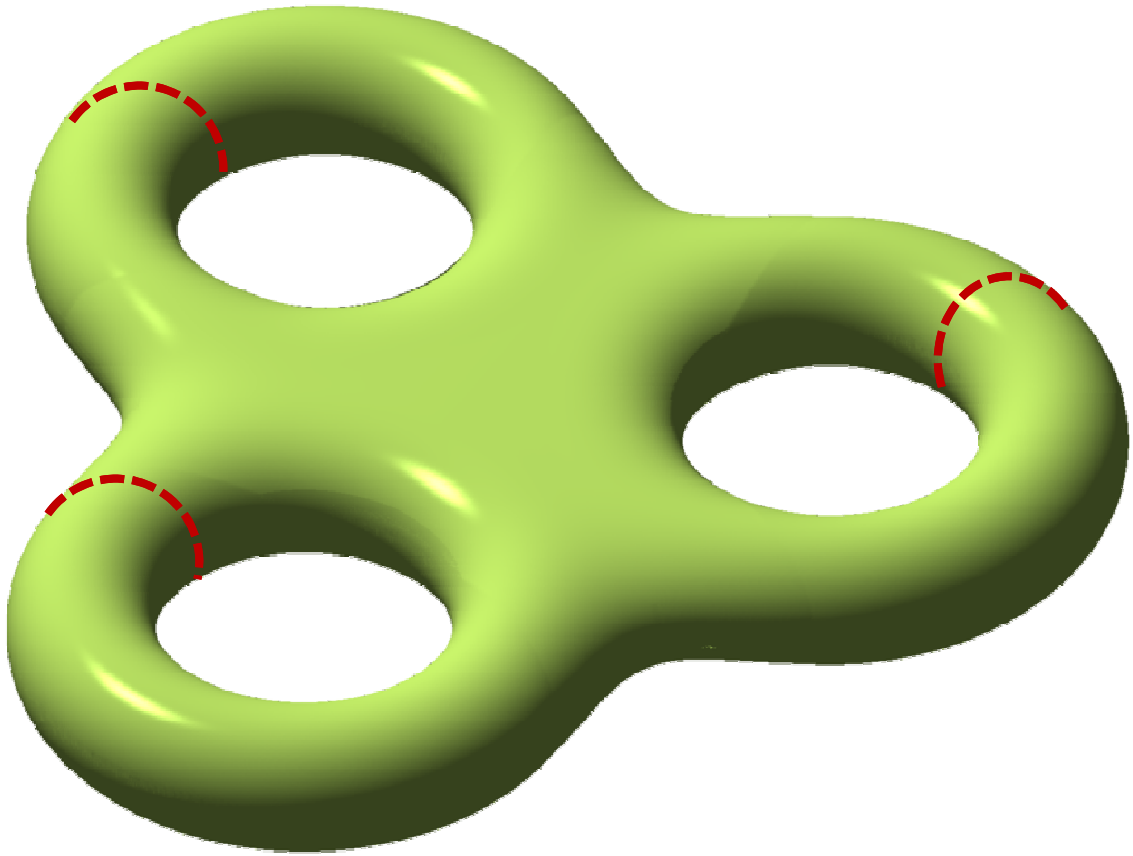


Genus 2

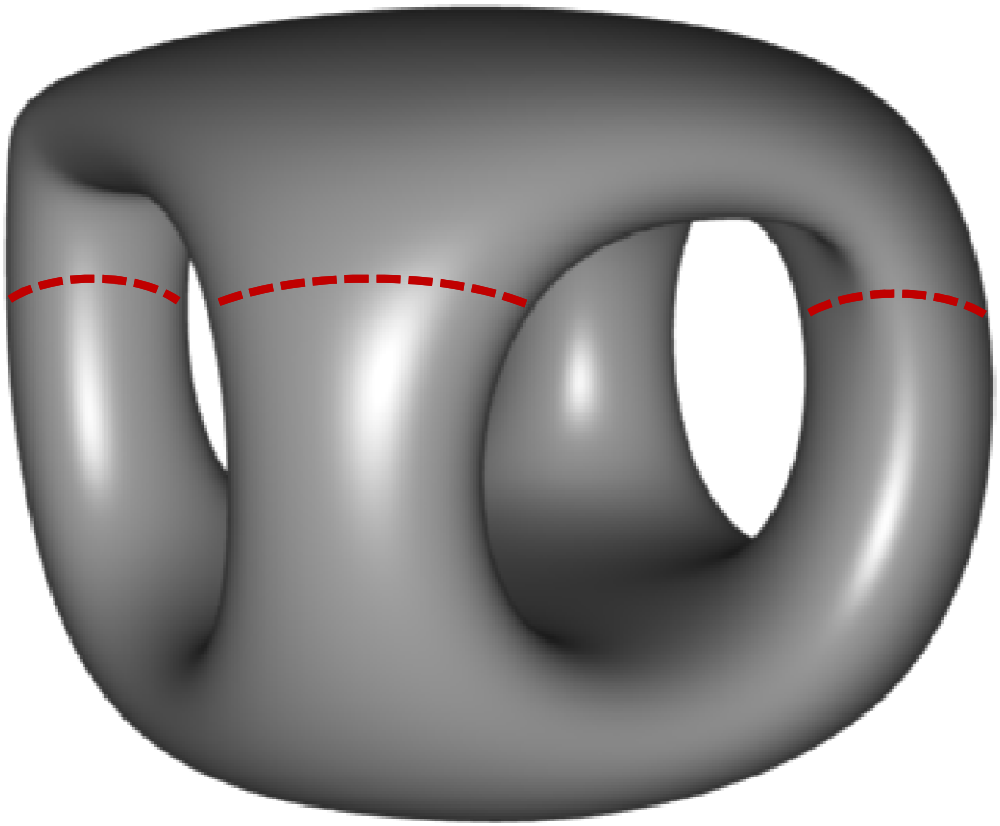




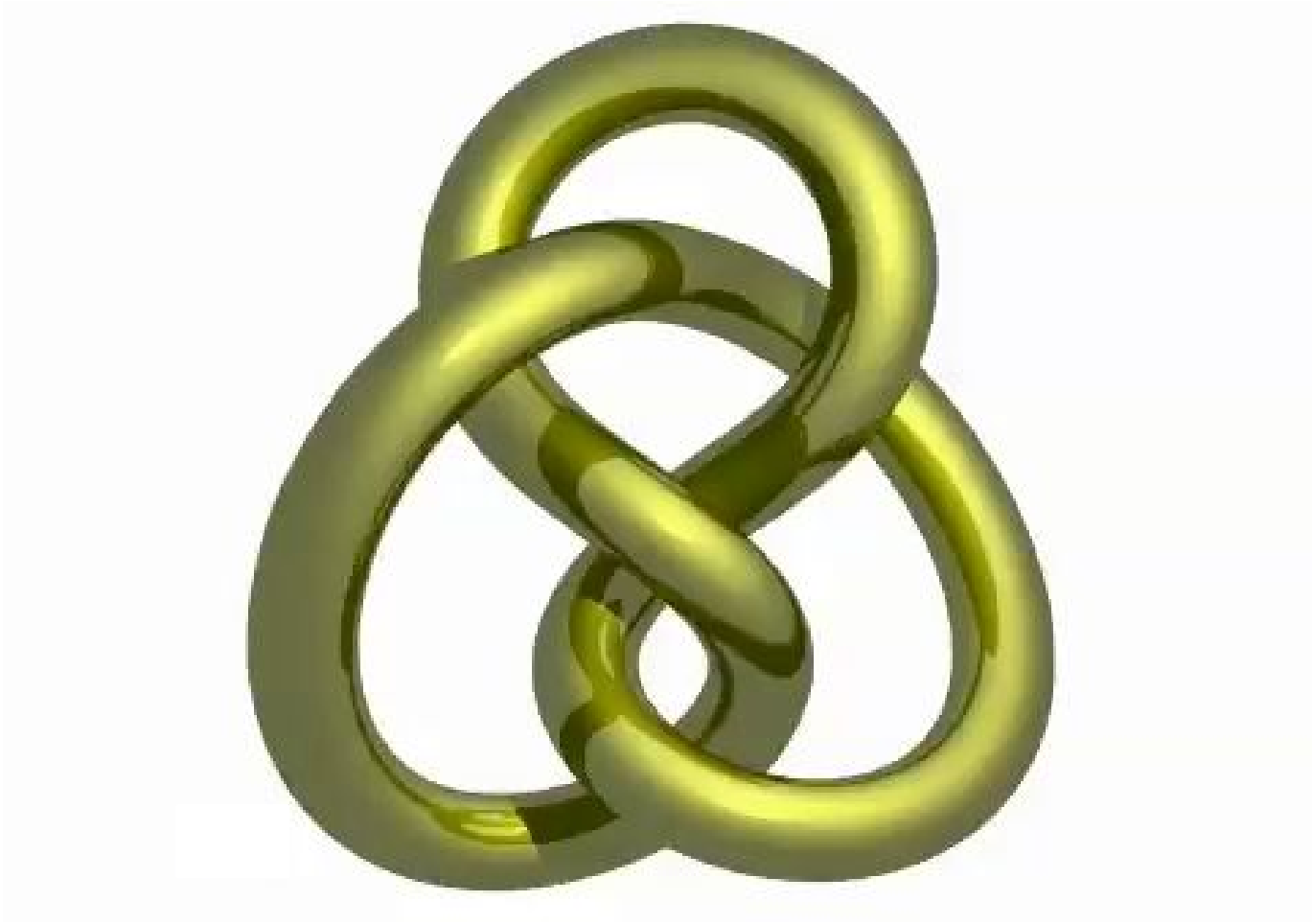
Genus 3



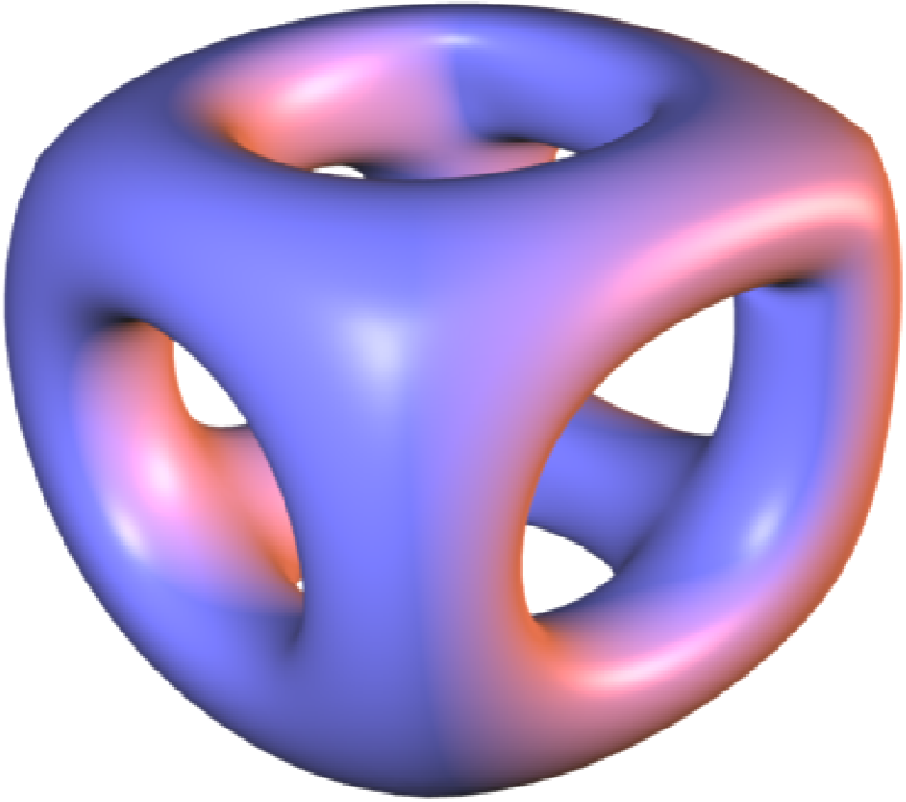
Genus 3



Genus?



Genus?



Euler equation for polyhedra

F=10 (6+4)

V=16 (8+8)

E=24 (12+12)

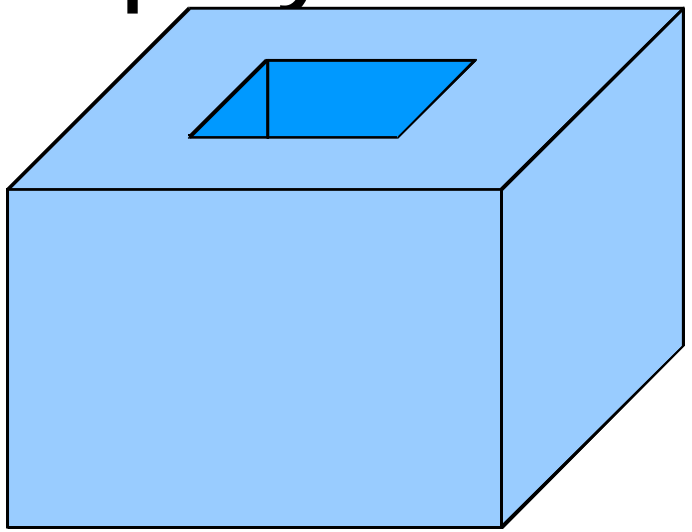
R=2 (two faces with a hole)

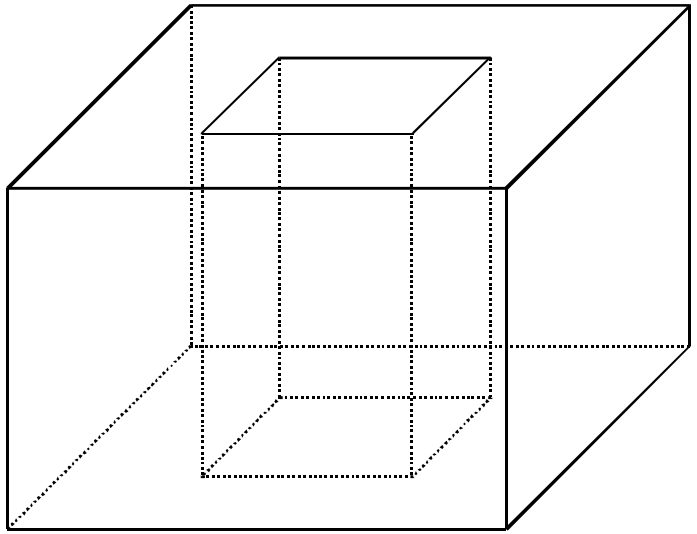
S=1 (a single shell)

H=1 (a pass-through hole)

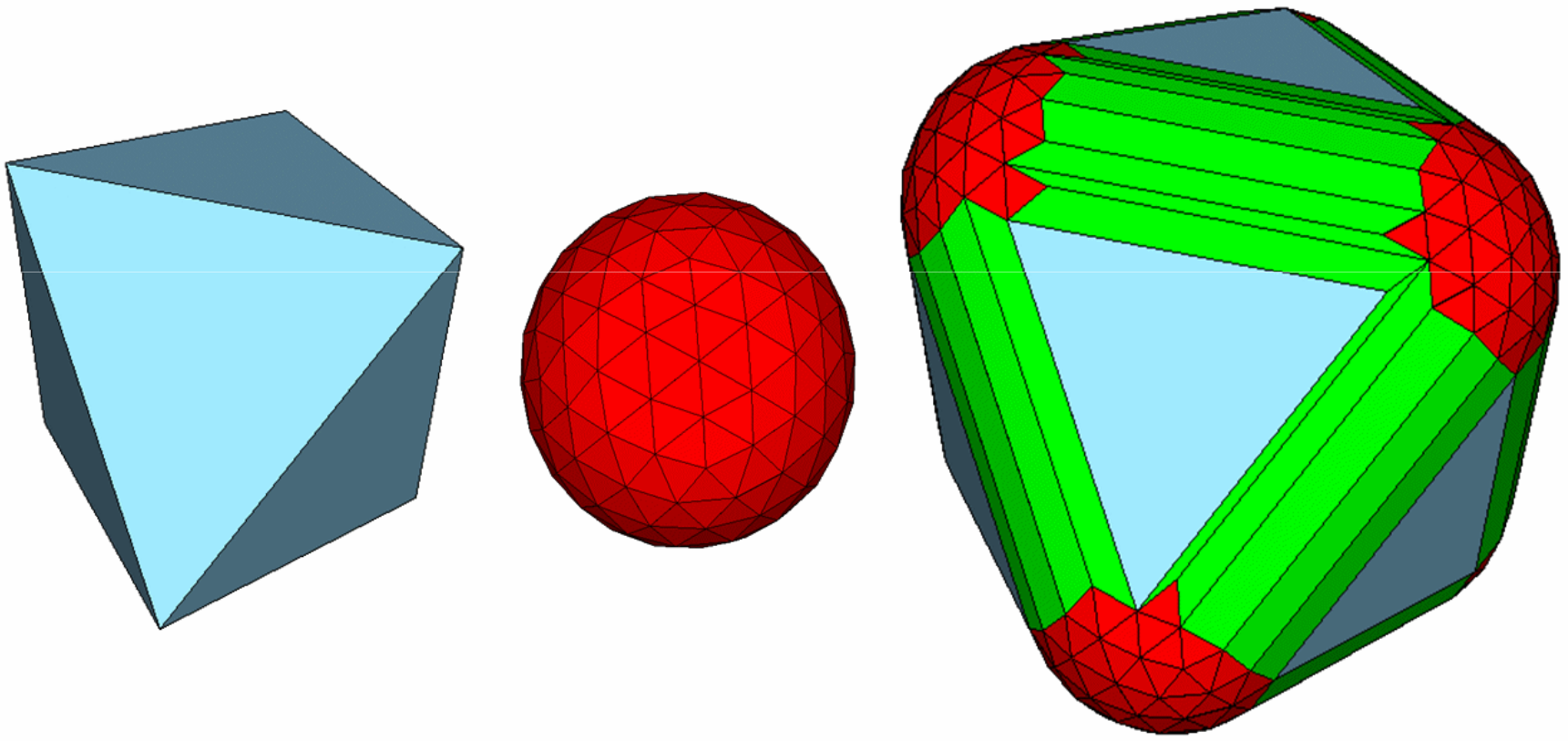
F+V=E+R+2(S-H)

10+16=24+2+2*(1-1)

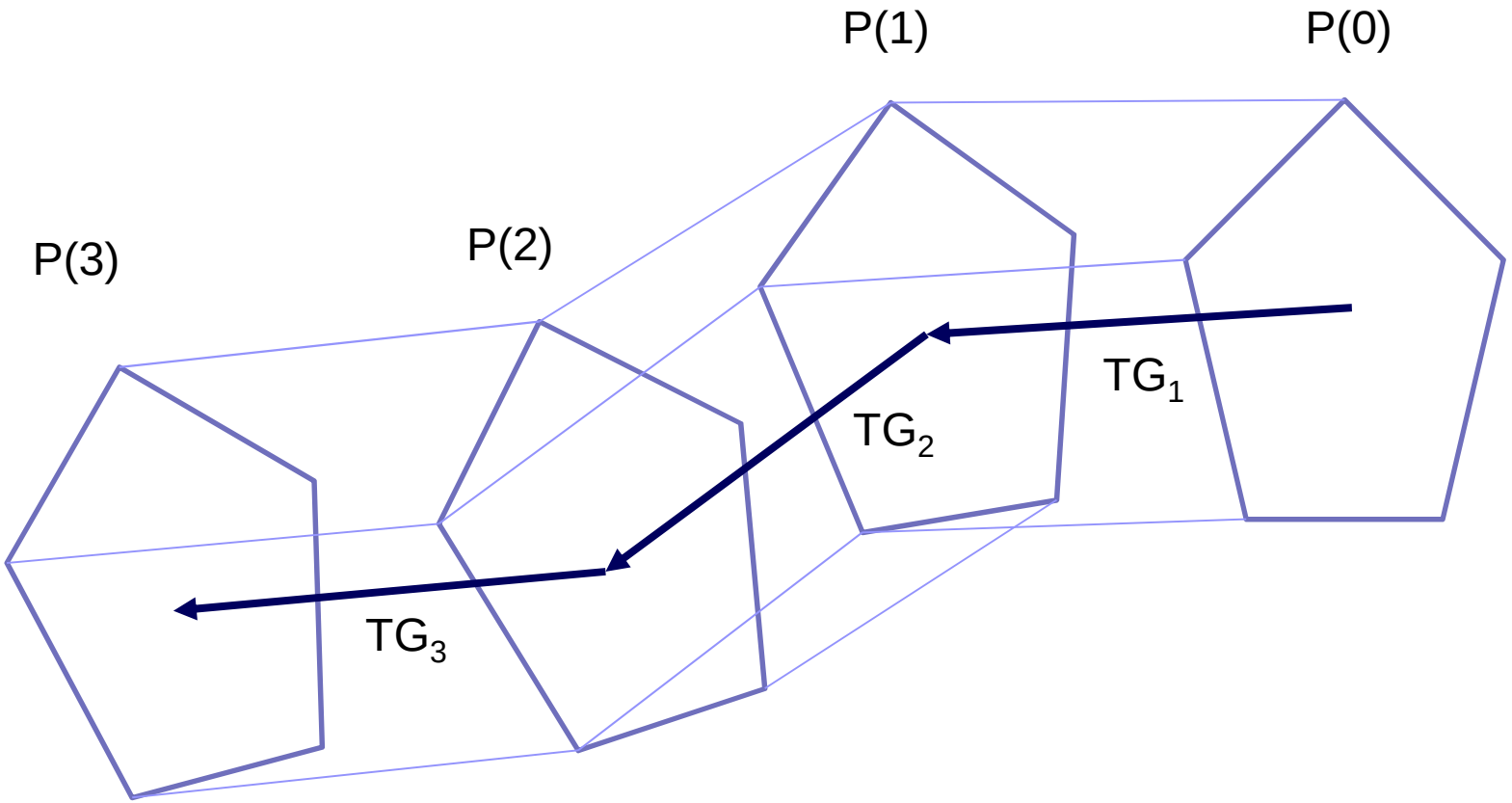




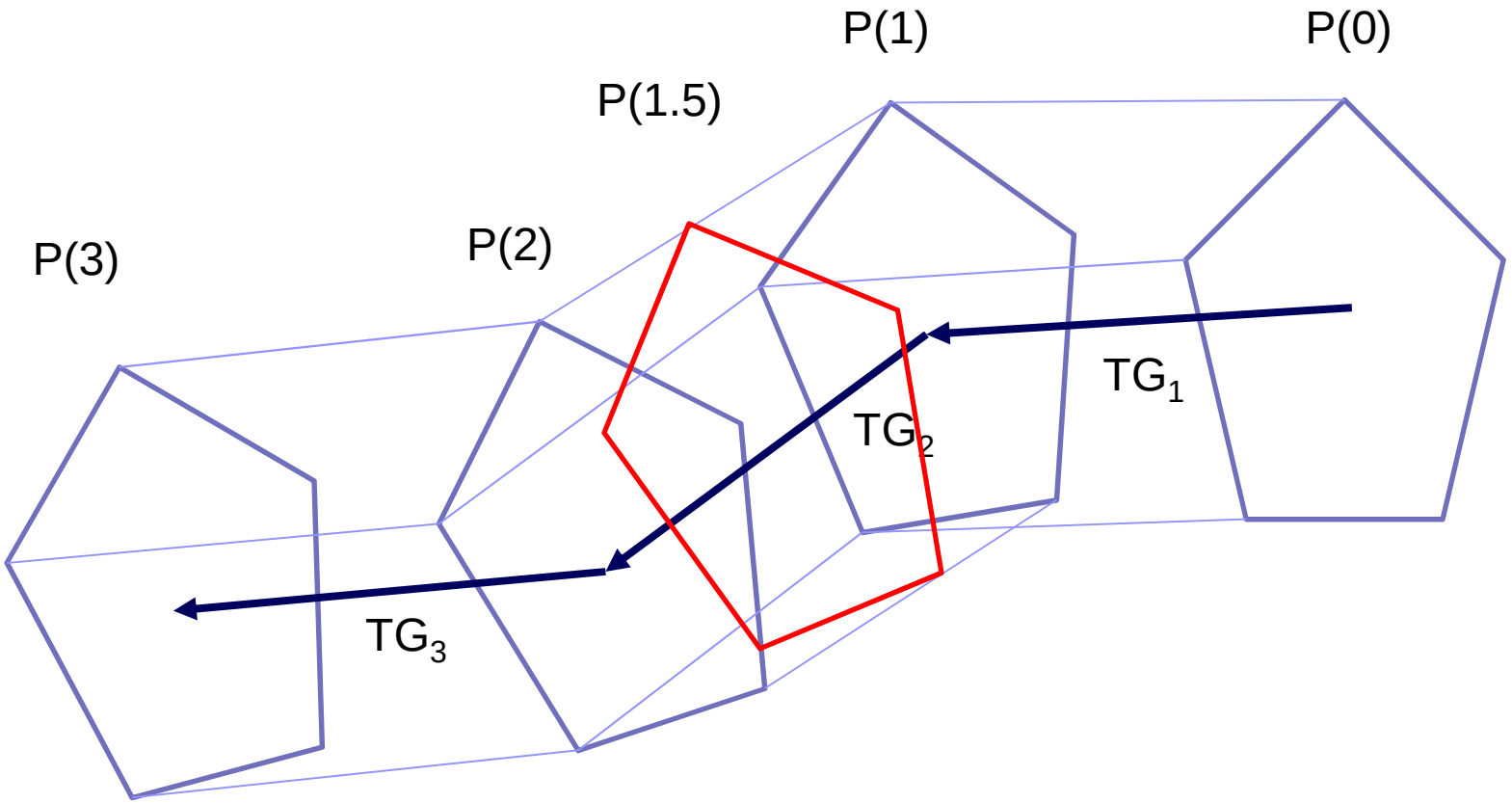
Minkoski sum



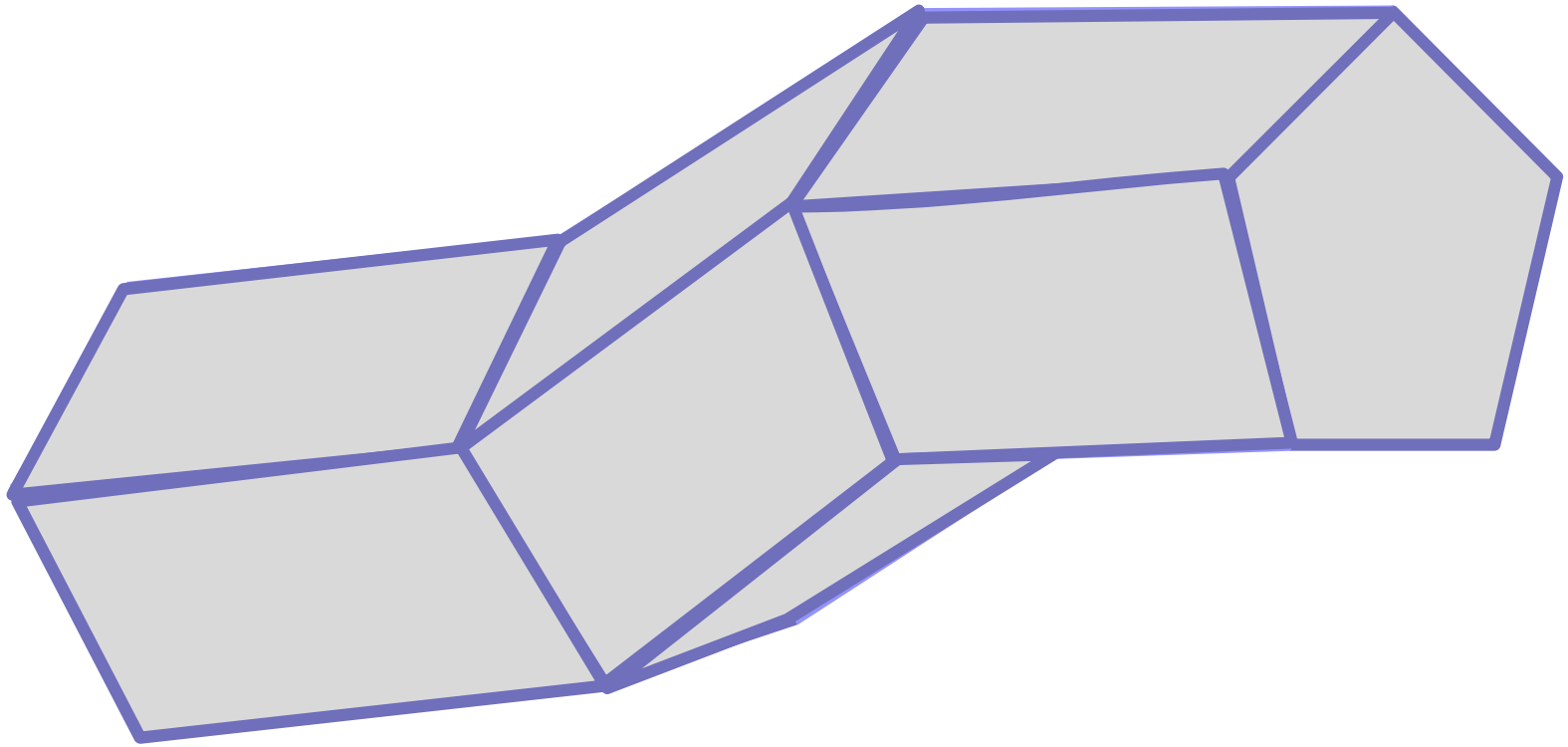
Sweep



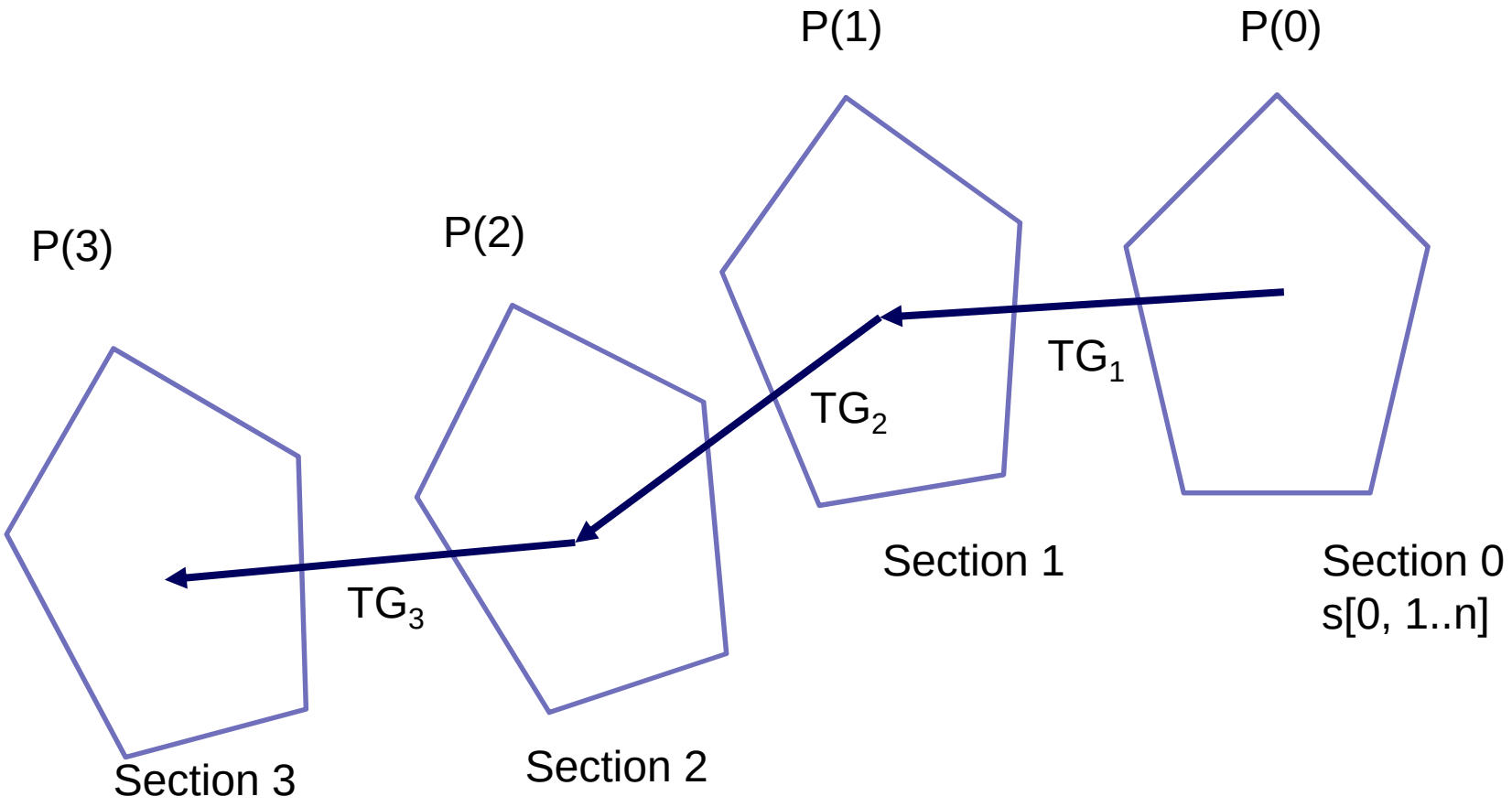
Sweep



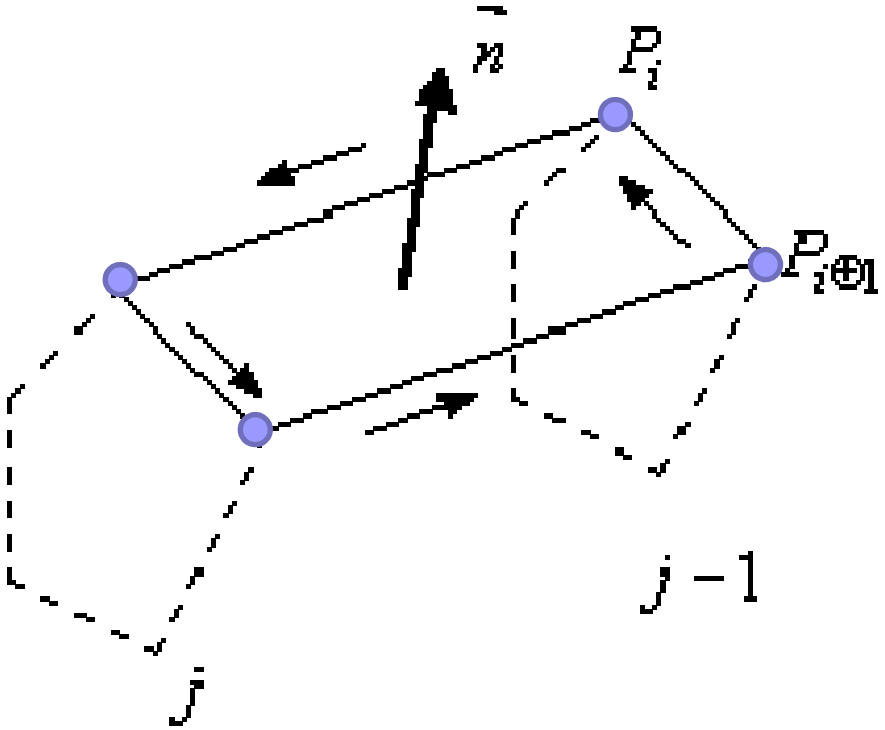
Sweep



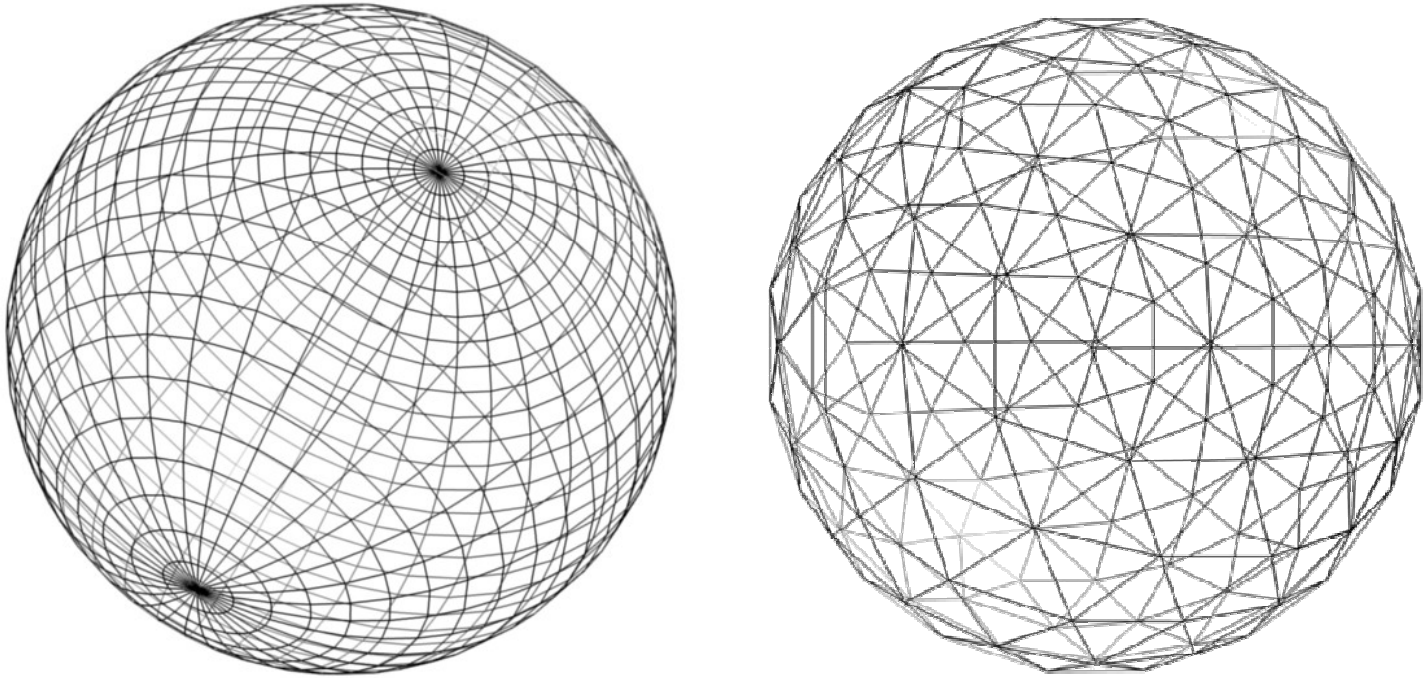
Sweep


P(1)
P(0)
P(3)
P(2)
TG1
TG2
TG3
Section 1
Section 0
s[0, 1..n]
Section 3
Section 2

Lateral faces



Sphere approximation



Sphere approximation