Visualisasi Aljabar Geometri
dengan GA-Viewer

Sumber: https://geometricalgebra.org/index.html

GA-Viewer

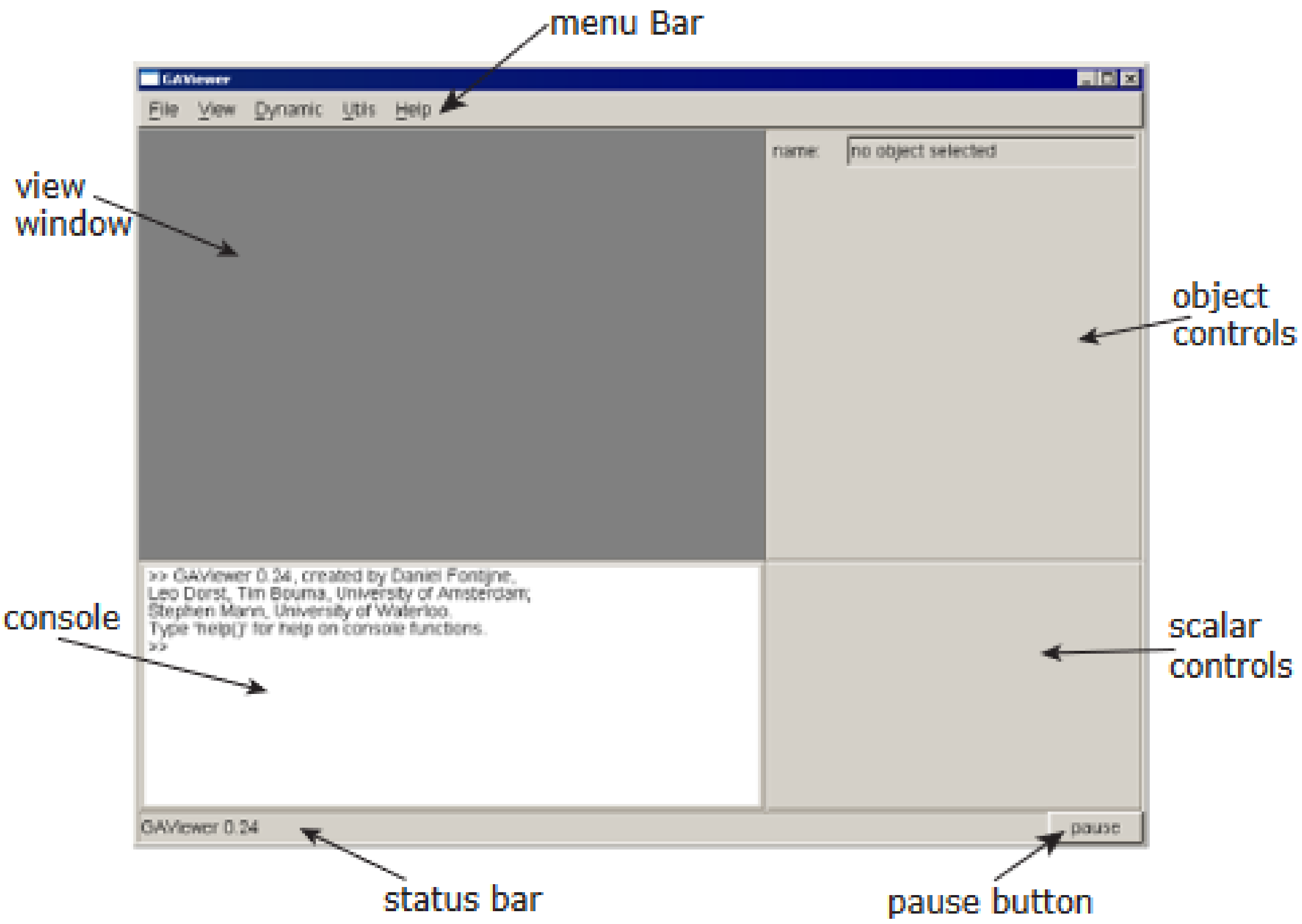


Figure 2.1: GAViewer user interface.

Getting Started

```
>> default_mode(e3ga)          # mode Euclidean dimensi 3
>> dm2(e1^e2)                  # menampilkan bivektor e12 dg mode
                               # dm2  (4  mode: dm1,dm2,dm3,dm4)
>> a = e1 - 2*e2
>> b = 3*e1 + e2
>> c = a ^ b
>> d = a.b
>> f = a*b
```

Latihan 1

>> default_model(c3ga)

model conformal dimensi 3

>> c1 = c3ga point(e1)
>> c2 = c3ga point(2*e1+e2)
>> c3 = c3ga point(e3)

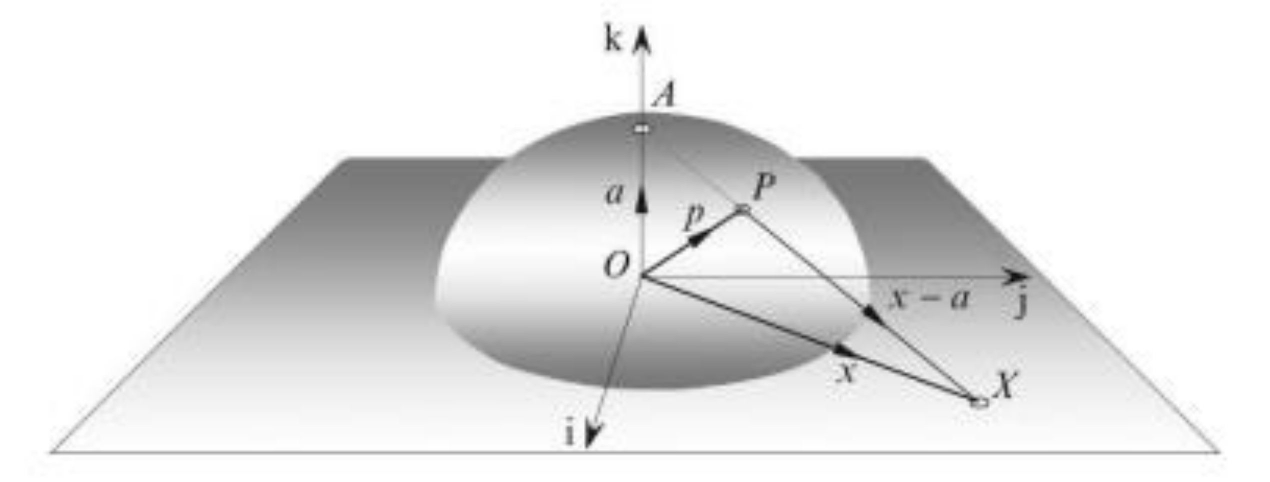
>> C = c1^c2^c3

>> R = e3*(e1+0.85*e3)

>> RC = R*C/R

>> RRC = R*RC/R

>> L = c1^c2^ni



Latihan 1 (lanjutan)

```
>> L = c1^c2^ni
>> RL = 1 + 0.1 dual(L)
>> RC = RL*C/RL
>> RRC = RL*RC/RL
>> pi1=c3ga point(e1+e2).(e2^ni)

>> rC   = pi1*C/pi1
>> rL   = pi1*L/pi1
>> rc1 = pi1*c1/pi1
```

Latihan 2

```
>> a = e1
>> b = e1+e2
>> c = a^b
```

```
>> b = e1^e2
>> g = green(e2^e3)
>> r = red(b+g)
>> y = yellow(0.8*b + 0.2*g)
```

```
>> (e1 + e2) ∧(e2 + e3) ∧(e3 + e1)
```

Visualisasi Lanjut

Untuk mengakses gambar-gambar pada slide selanjutnya

1. Load terlebih dahulu file-file program (ekstensi .g)

2. Untuk mengakses gambar ke-j dari Bab ke-i gunakan perintah

   >> FIG(i,j)

3. Untuk melihat gambar-gambar pada Bab ke-i gunakan perintah

   >> FIG (i)

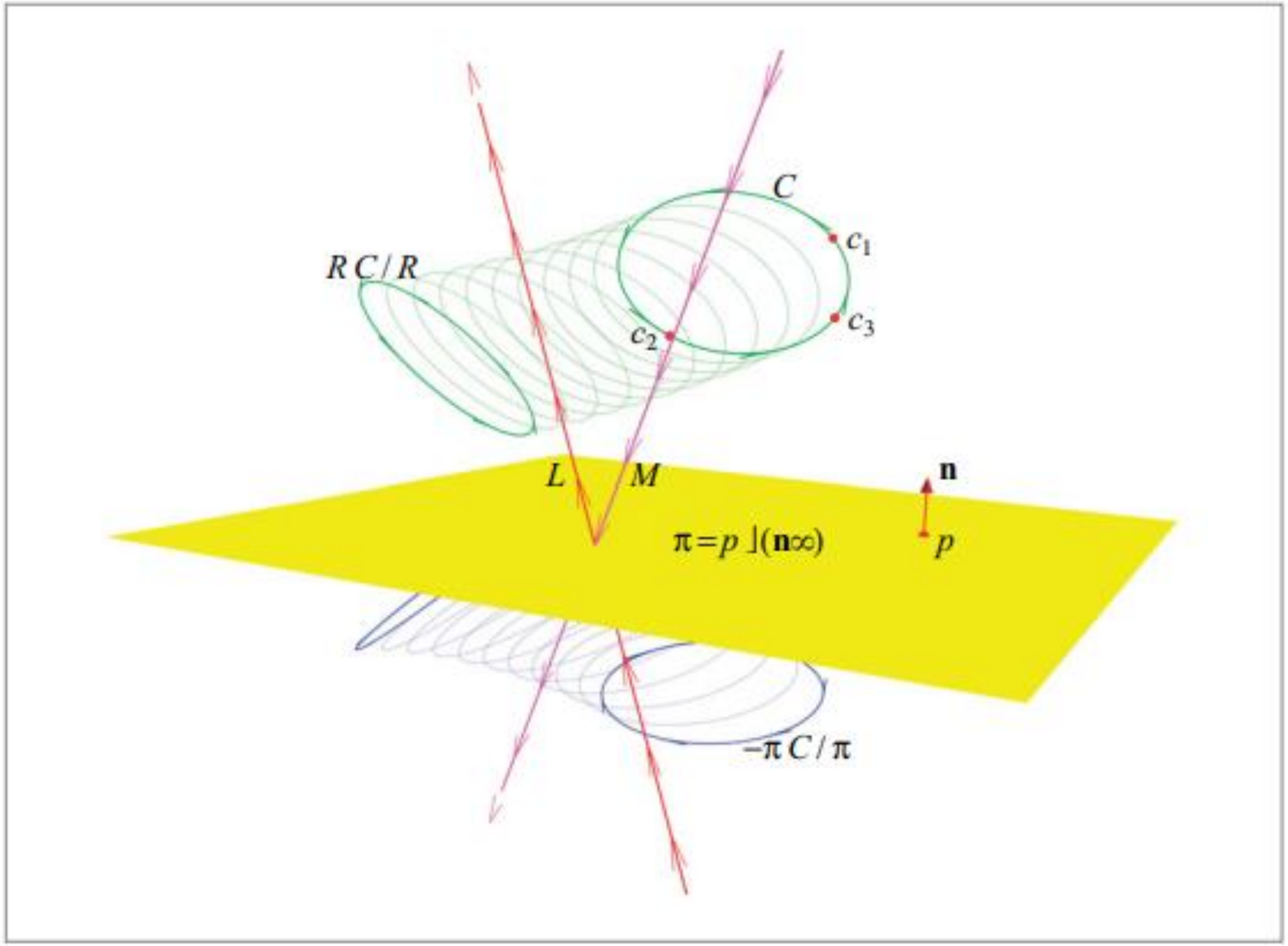


Figure 1.1: The rotation of a circle C (determined by three points c_1, c_2, c_3) around a line L, and the reflections of those elements in a plane Π.

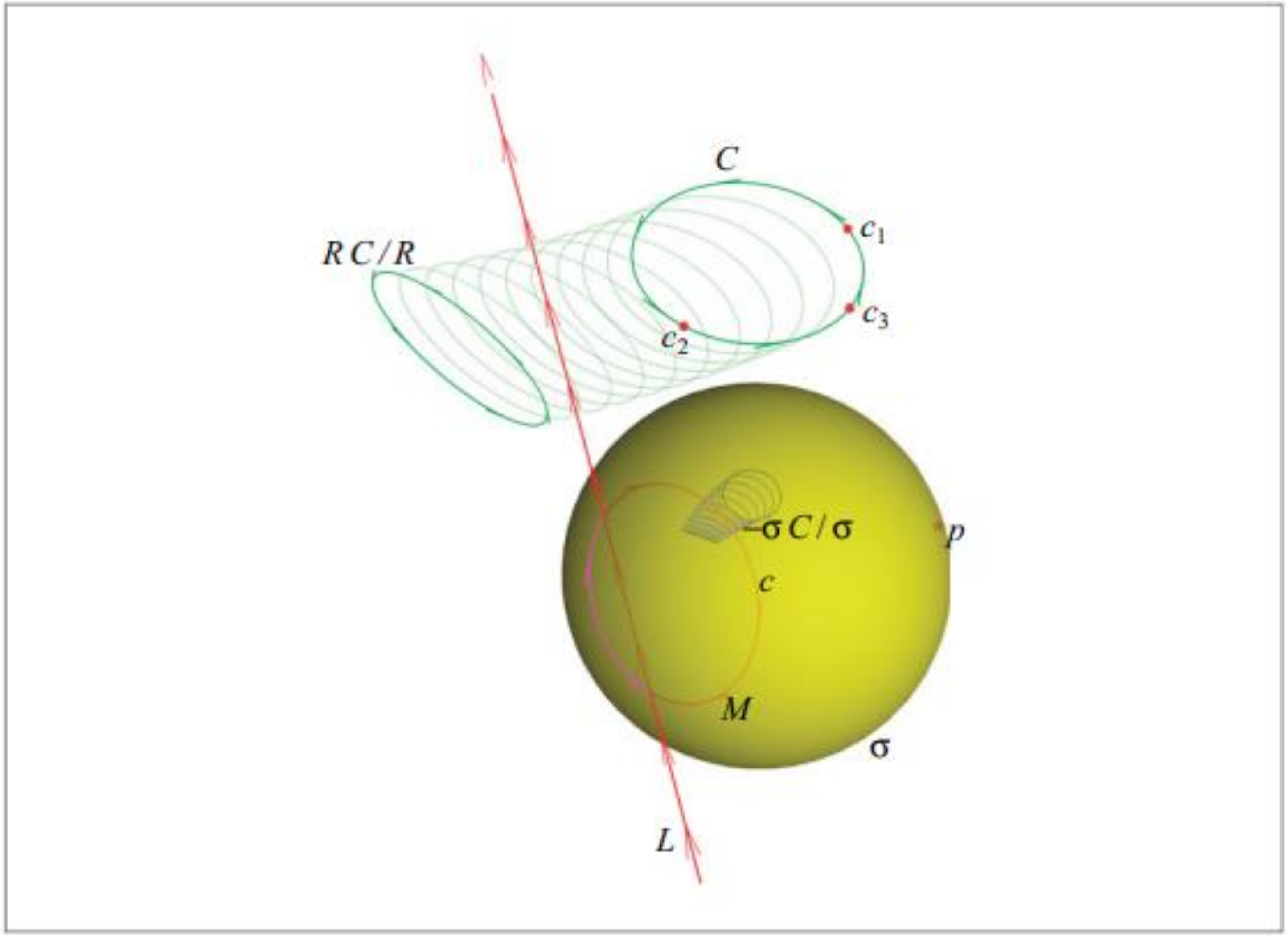


Figure 1.3: The rotation of a circle C (determined by three points c_1, c_2, c_3) around a line L, and the reflections of those elements in a sphere σ.

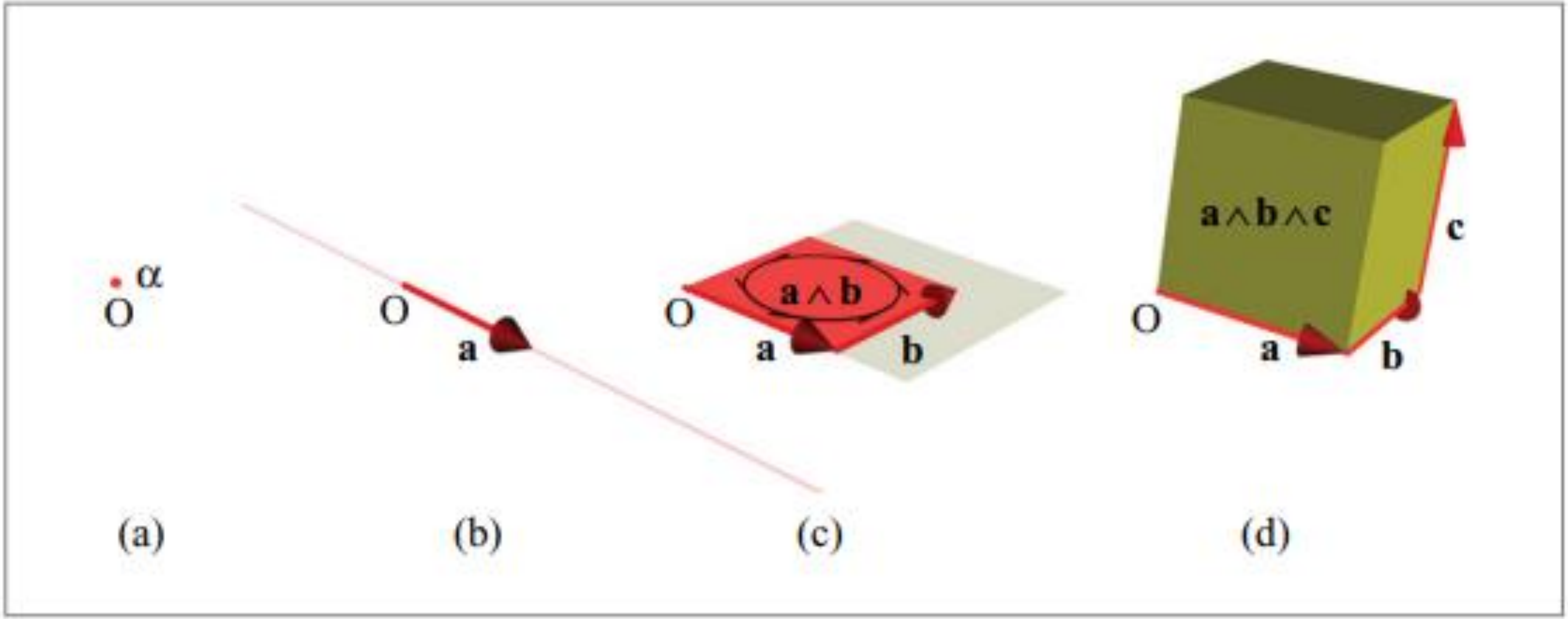


Figure 2.1: Spanning homogeneous subspaces in a 3-D vector space.

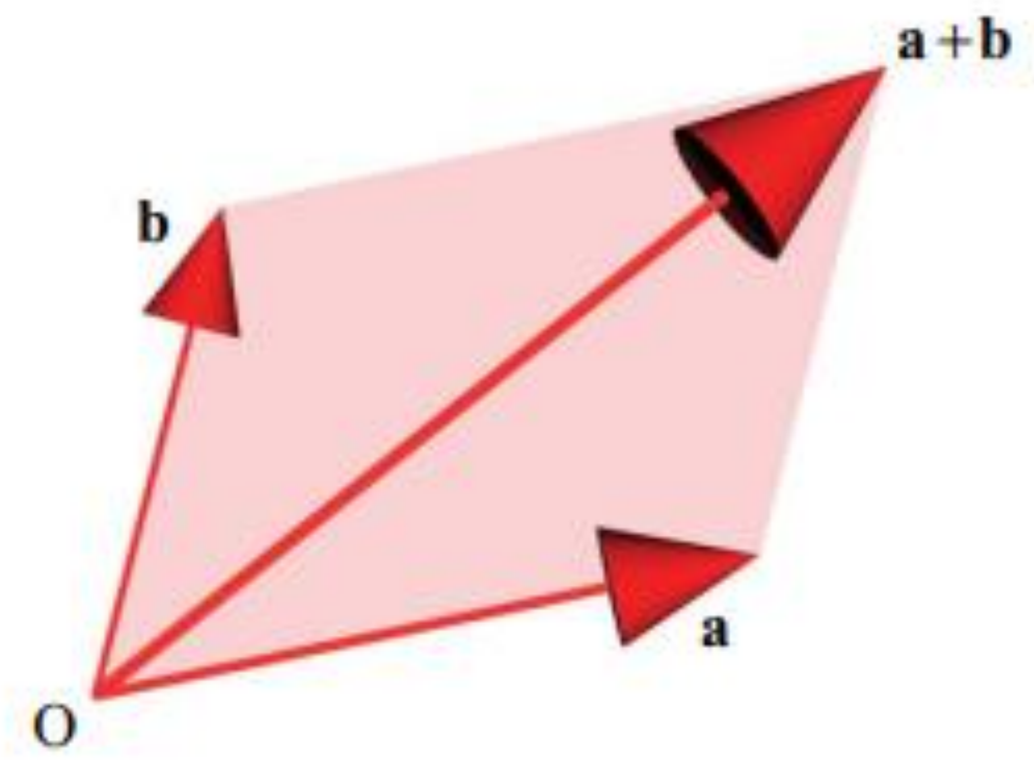


Figure 2.2: Imagining vector addition.

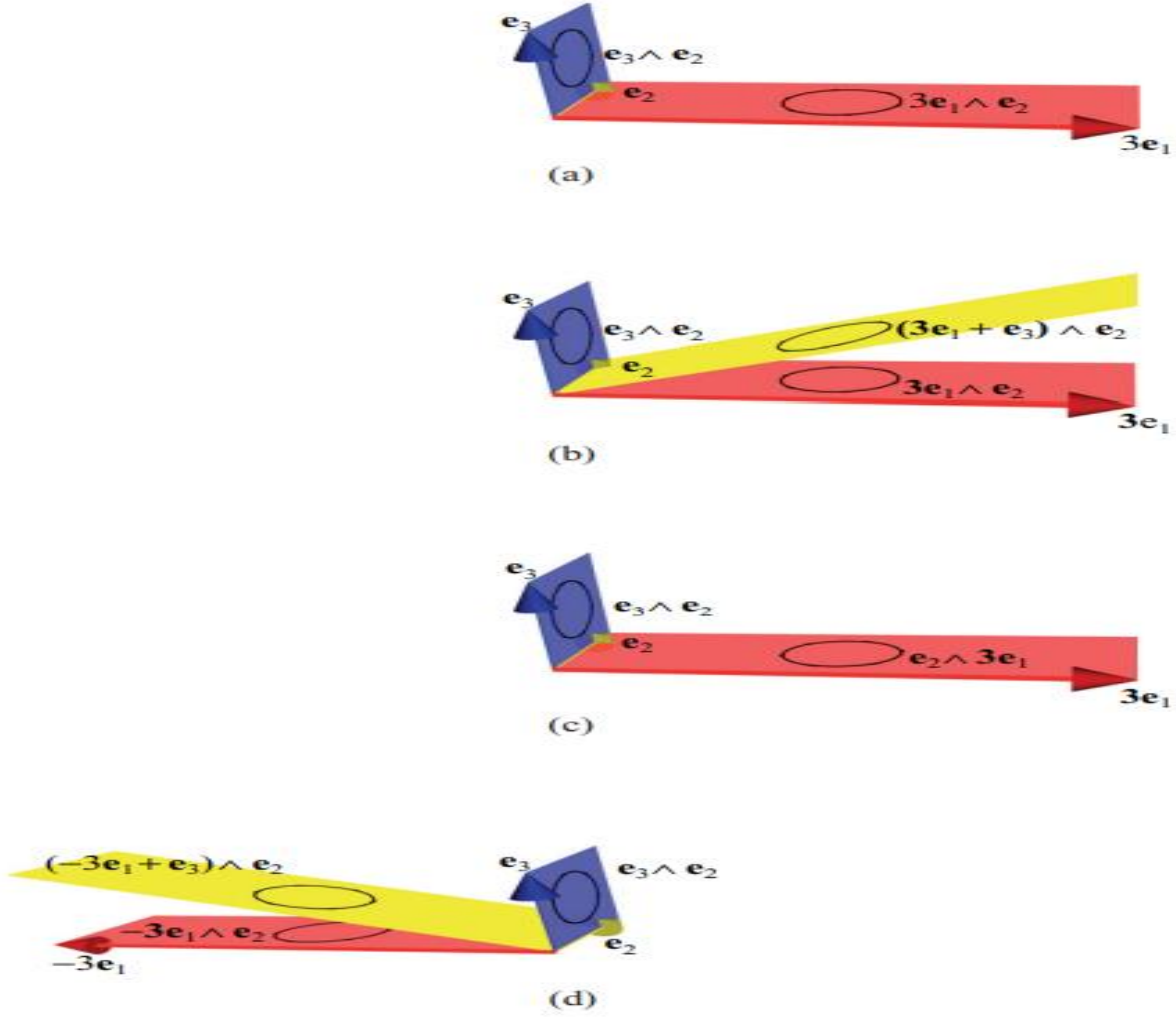


Figure 2.5: Bivector addition in 3-D space: orientation matters. (a),(b): $(3\mathbf{e}_1 \wedge \mathbf{e}_2) + (\mathbf{e}_3 \wedge \mathbf{e}_2) = (3\mathbf{e}_1 + \mathbf{e}_3) \wedge \mathbf{e}_2$; (c),(d): $(\mathbf{e}_2 \wedge 3\mathbf{e}_1) + (\mathbf{e}_3 \wedge \mathbf{e}_2) = (-3\mathbf{e}_1 + \mathbf{e}_3) \wedge \mathbf{e}_2$, which is a different bivector.

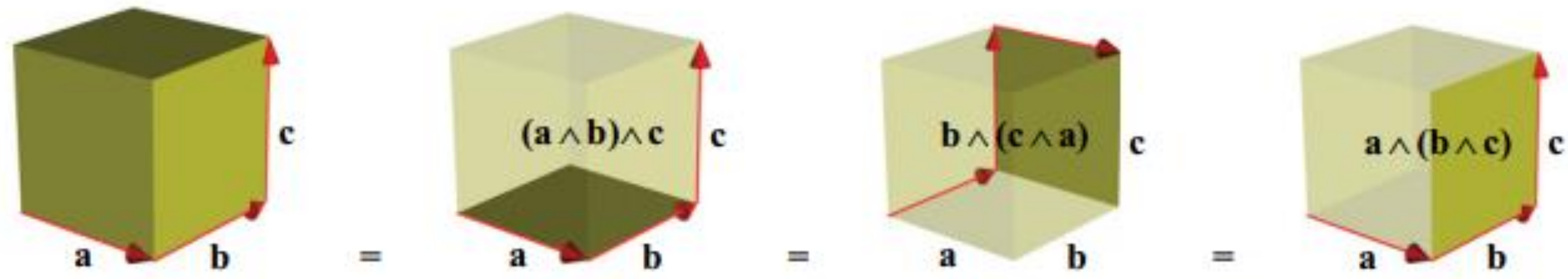


Figure 2.6: The associativity of the outer product.

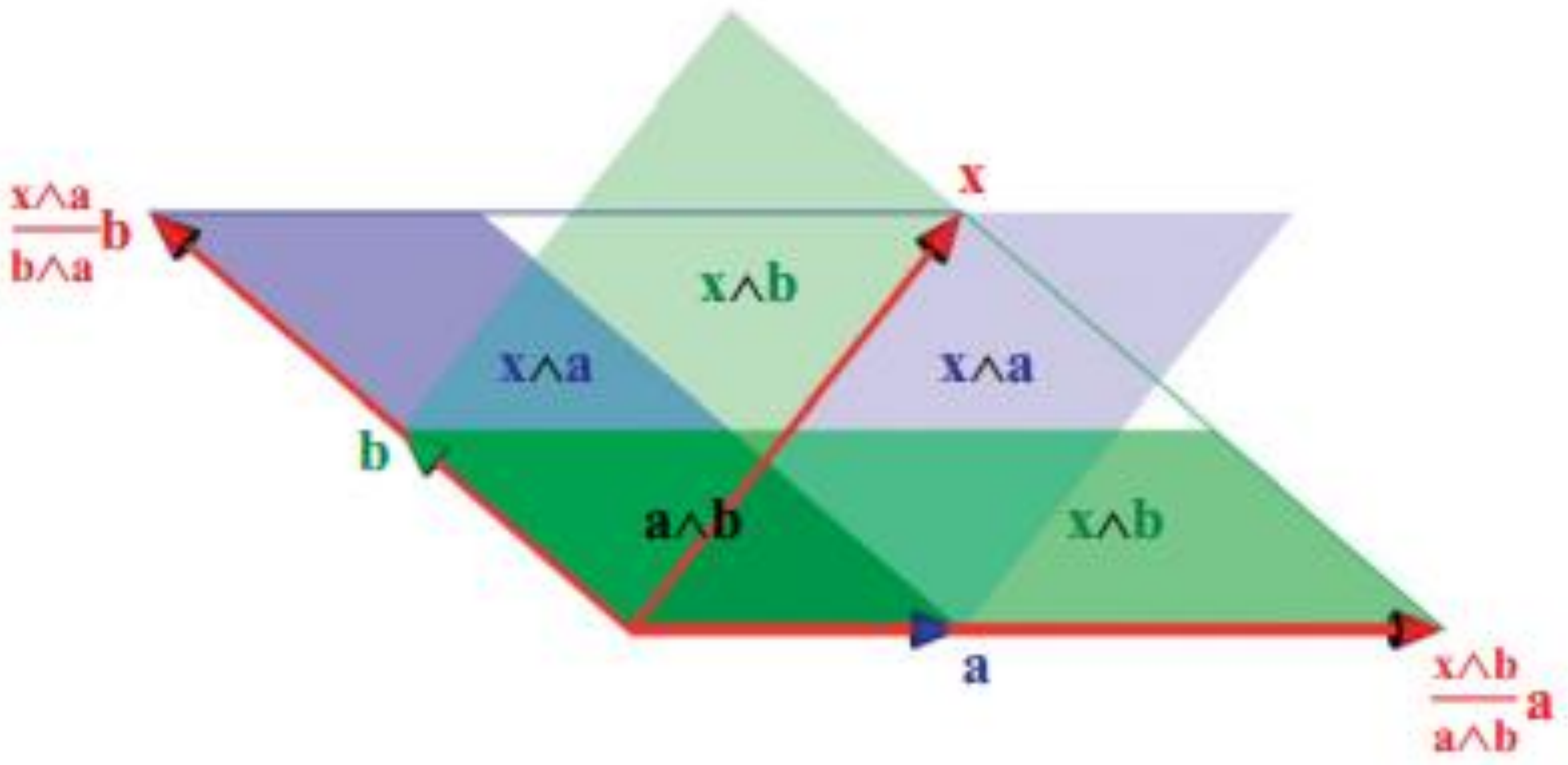


Figure 2.7: Solving linear equations with bivectors.

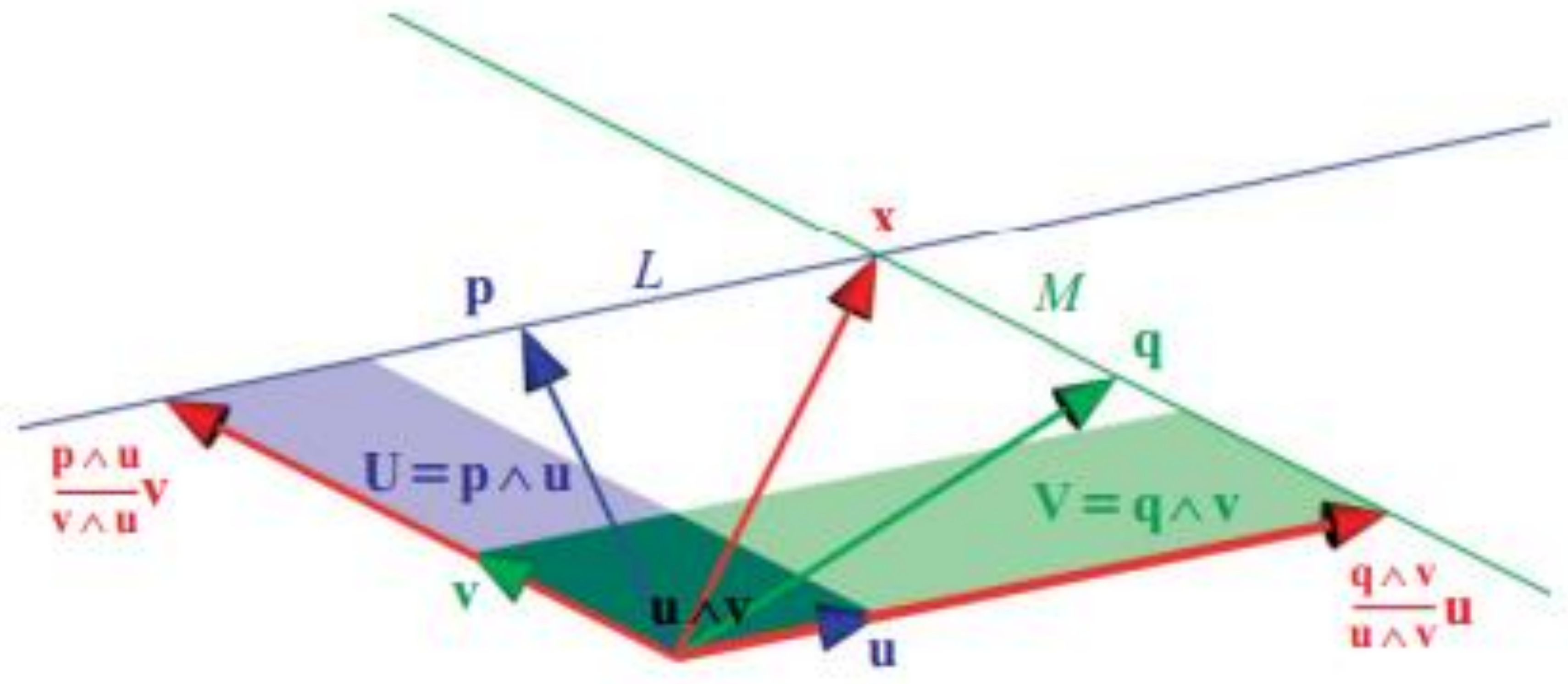


Figure 2.8: Intersecting lines in the plane.

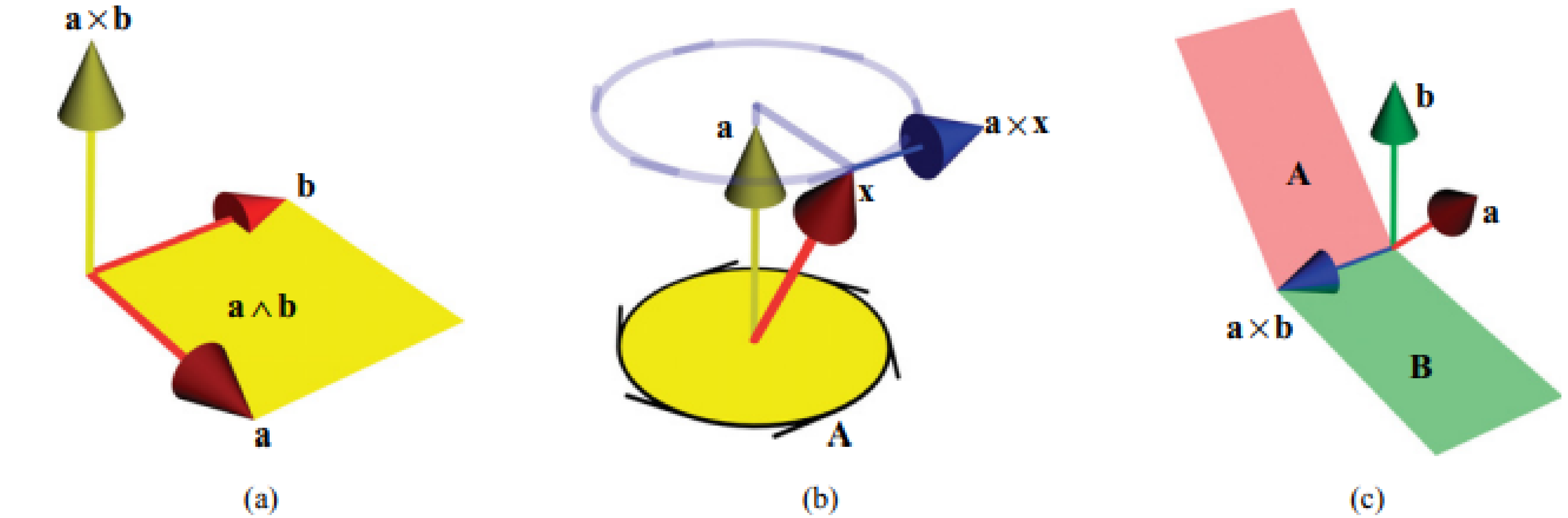


Figure 3.7: Three uses of the cross product.

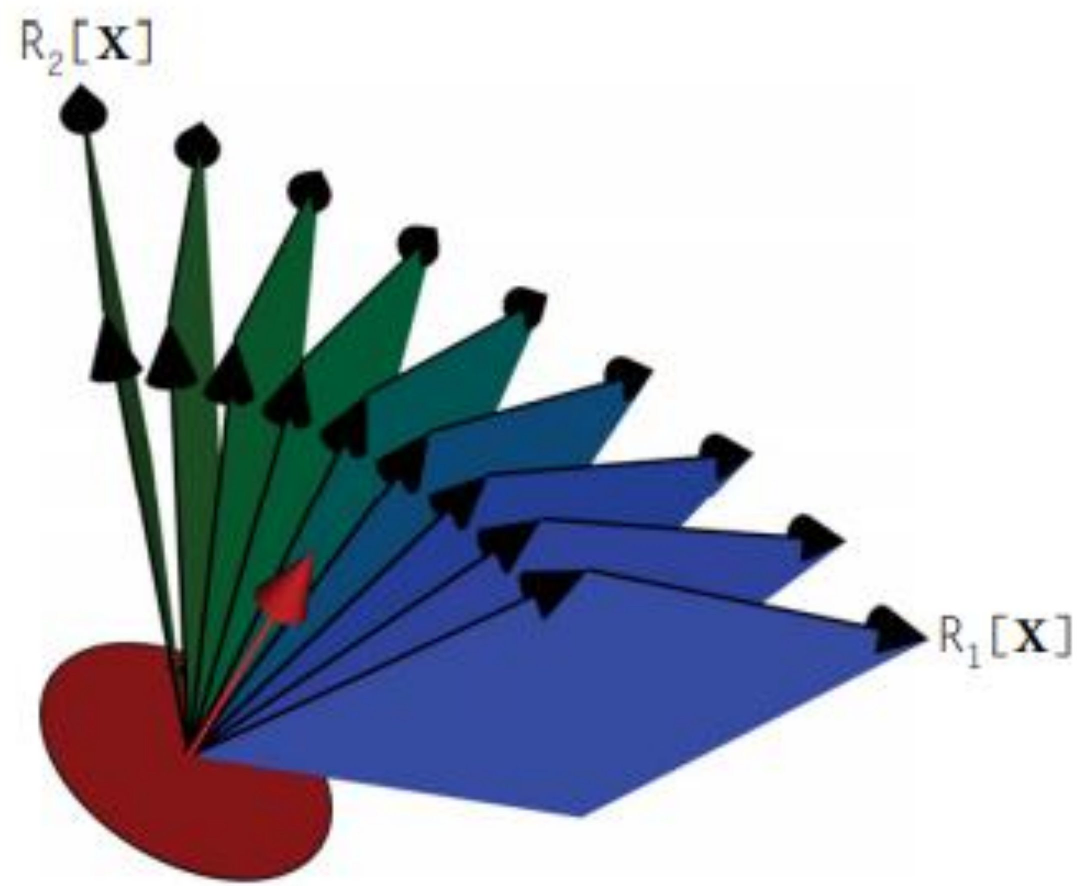


Figure 10.4: The interpolation of rotations illustrated on a bivector $\mathbf{X}$. The poses $R_1[\mathbf{X}]$ and $R_2[\mathbf{X}]$ are interpolated by performing the rotor R_2/R_1 in eight equal steps.

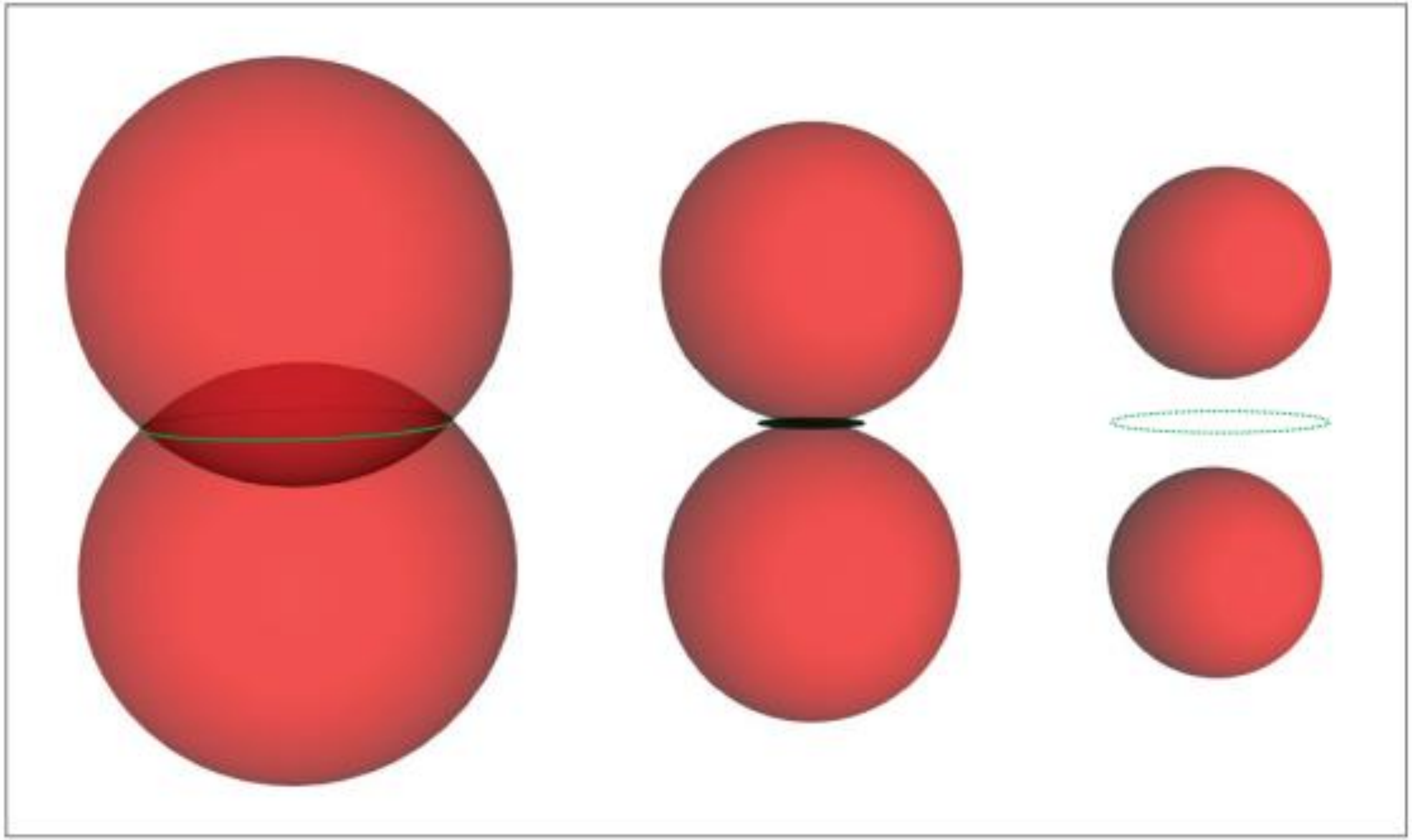


Figure 14.2: Intersection of two spheres of decreasing radii, leading to (a) a real circle, (b) a tangent 2-blade, and (c) an imaginary circle.

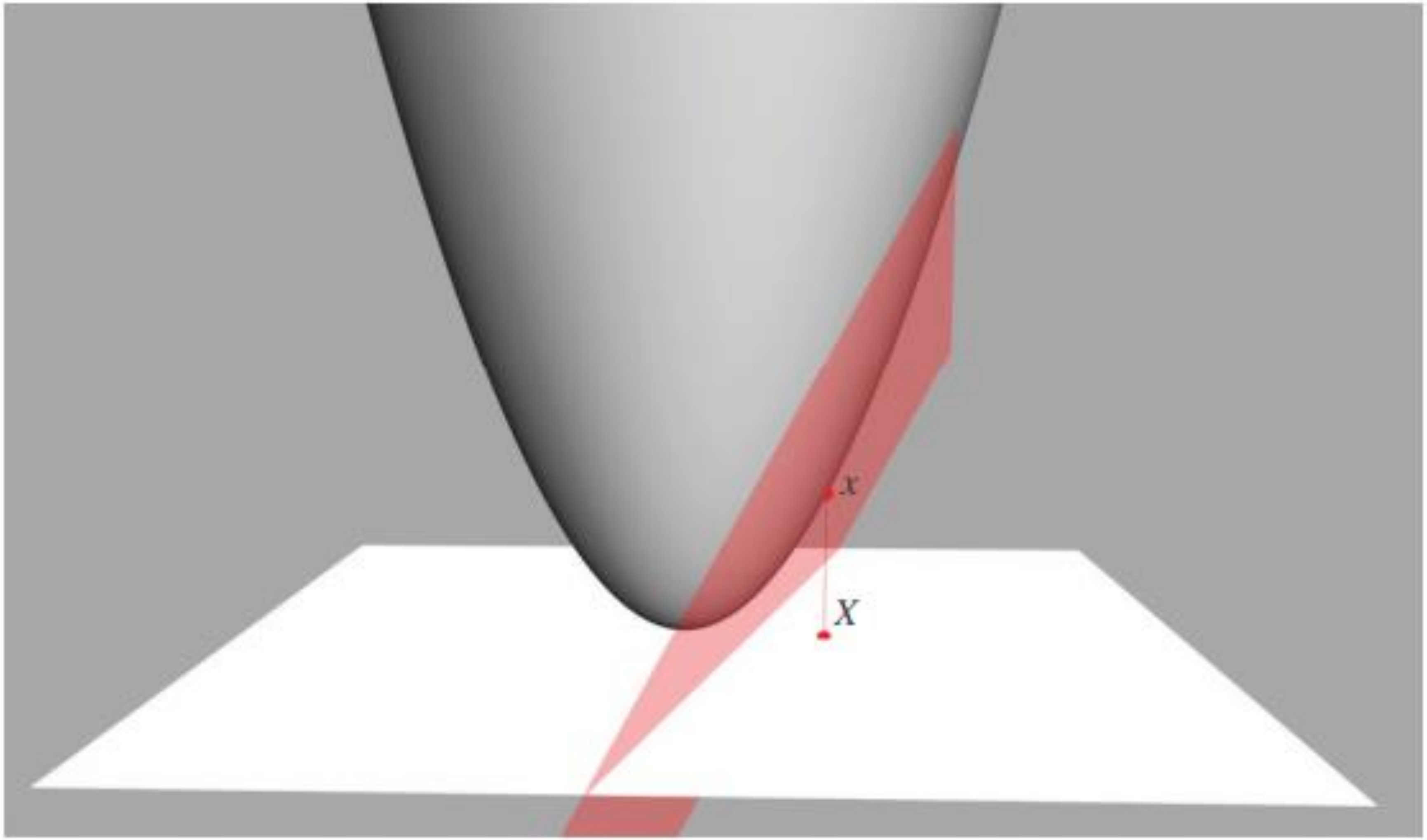


Figure 14.3: Visualization of a 2-D Euclidean point X as a conformal vector x on the representative paraboloid of the conformal model. The tangent plane at x has the dual representation x.

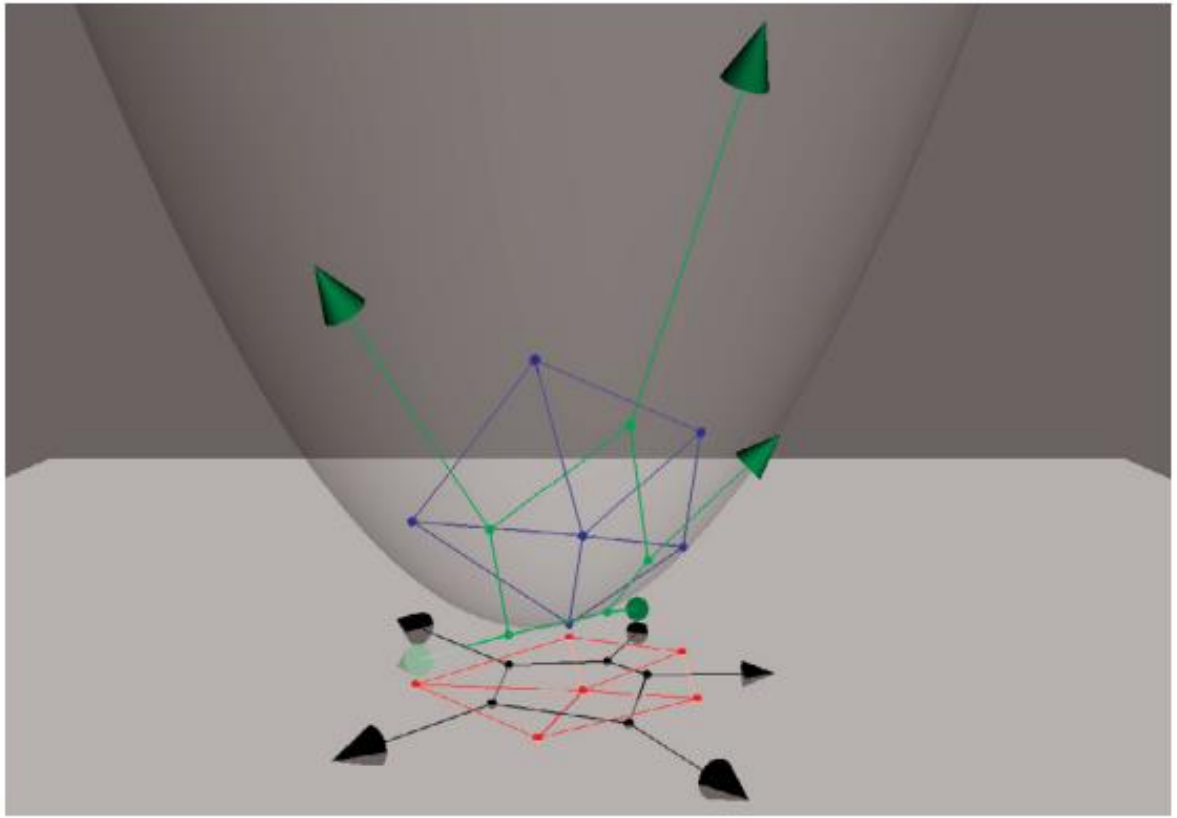


Figure 14.7: The Voronoi diagram of six red points in a 2-D Euclidean space is indicated in black, and their Delaunay triangulation in red. In the conformal model, the represented Delaunay triangulation (in blue) is obtained by making the convex hull of the represented points on the paraboloid, which is the five-sided pyramid. The representation of the Voronoi diagram is its dual in the conformal model, depicted in green, which is a planar pentagon with five rays (indicated by tangent vectors). The green points are below the paraboloid. They are the representations of the circumcircles of triangles, whose centers are the corresponding black points of the Voronoi diagram.

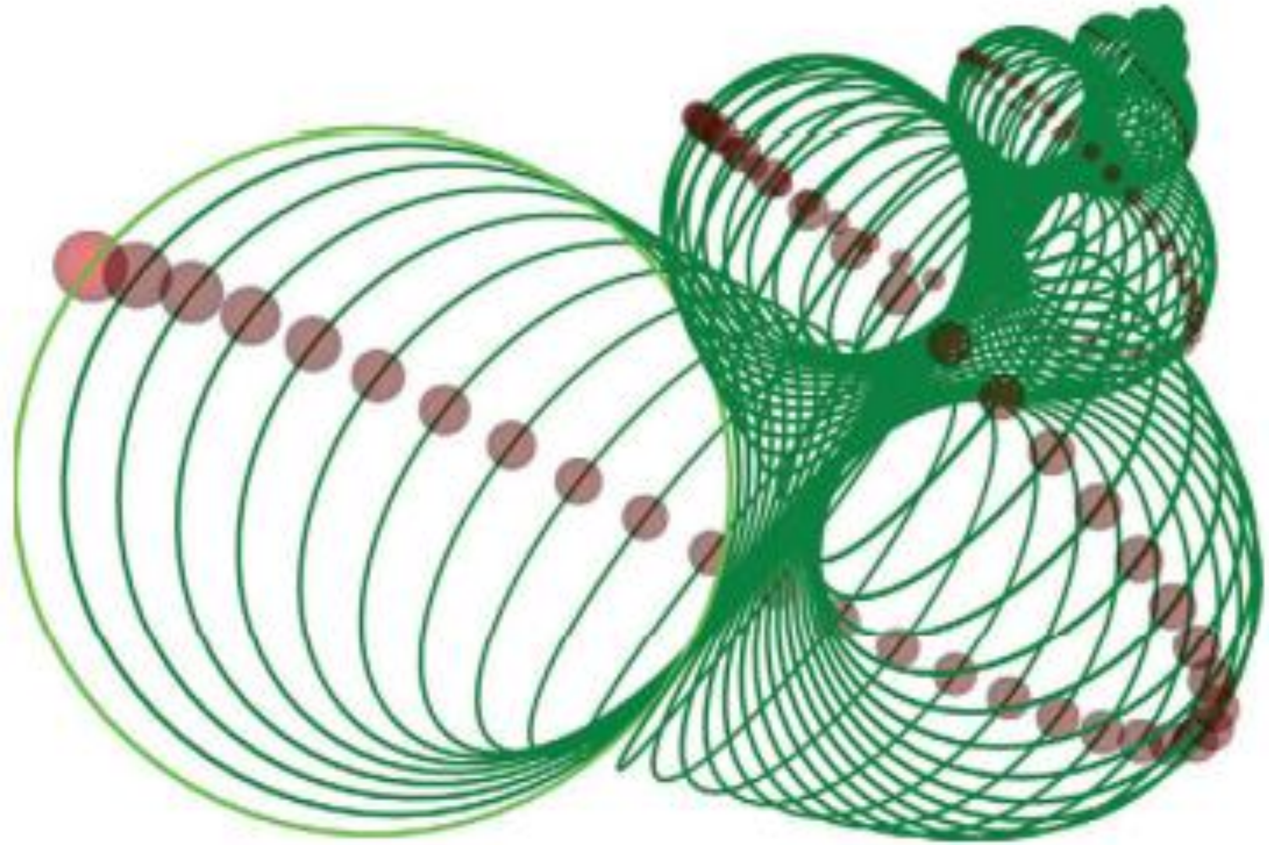


Figure 16.3: A positively scaled rigid body motion rotor repeatedly applied to a circle and a point (both displayed in light colors) generates an escargoid (snail shell).