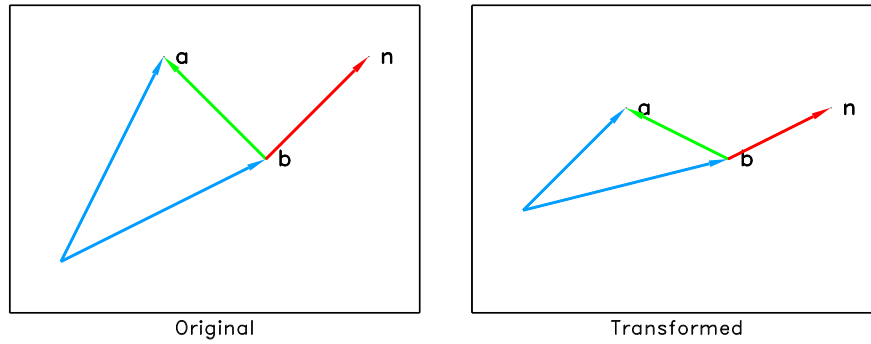


Transformation of Normals

CSCI 4229/5229



Let a and b be two position vectors defining a plane and n be the normal perpendicular to the plane. Then

$$n \cdot (a - b) = 0 \quad (1)$$

or equivalently

$$n^T (a - b) = 0. \quad (2)$$

Now define a transformation matrix M that applies to a and b . The normal vector must also be transformed, and call that transformation matrix N . The transformed normal must still be perpendicular to the transformed vectors defining the plane, therefore

$$Nn \cdot M(a - b) = 0 \quad (3)$$

or equivalently

$$(Nn)^T M(a - b) = 0, \quad (4)$$

so that

$$n^T N^T M(a - b) = 0. \quad (5)$$

Combining Eqs. (2) and (5) implies that

$$N^T M = I \quad (6)$$

so that

$$N^T = M^{-1} \quad (7)$$

or

$$N = M^{-1T} \quad (8)$$

Q.E.D.