On the fifth Euclidean postulate

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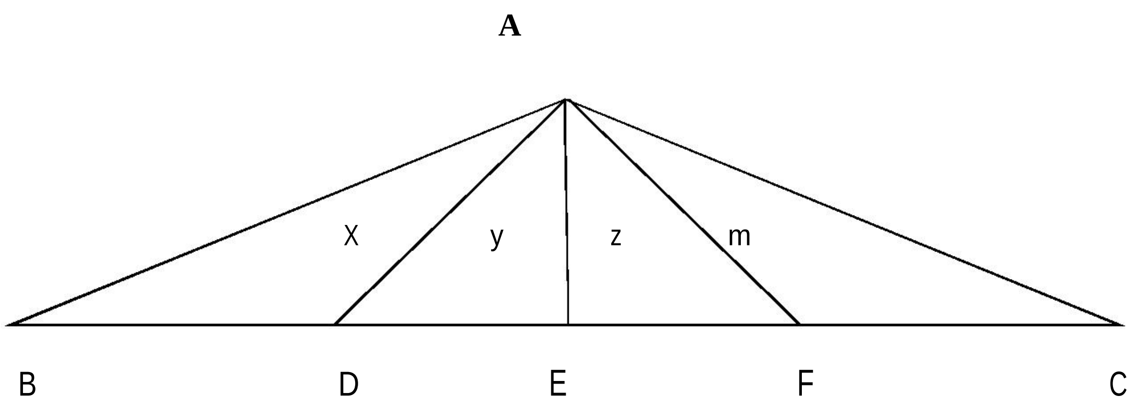
Abstract

Matrices and determinants are widely used to solve problems in electronics, statics , robotics , linear programming , optimization , intersections of planes , genetics, physics , cosmology and all other areas of science and engineering. In this work, we attempt to deduce E5 from E1 to E4 by applying determinants.

Key words: Euclidean postulates, matrices and determinants, new approaches



Euclidean Figure 1

1.Constructions

Let ABC be the given Euclidean triangle. On BC, take points D , E and F. Join points A and D;A and E;A and F. Let x , y , z and m respectively denote the sum of the interior angles of triangles ABD,ADE,AEF and AFC. And let a , b and c denote the interior angle sum of triangles ABE,ADF and AEC respectively

2. Results

Since angles BDE, DEF and EFC are all straight angles they are all each equal to 180 degree.

Let v be the value of this 180 degree. (1)

Using (1) , $x + y = v + a$ (2)

$y + z = v + b$ (3)

$m + z = v + c$ (4)

By applying the above elements namely, x , y , z , a , b , c and v , Let us Formulate the following determinants.

$$|A| = \begin{vmatrix} x & y & v \\ a & z & y \\ b & v & m \end{vmatrix} \quad (5)$$

$$|B| = \begin{vmatrix} x & a & b \\ y & z & v \\ v & y & m \end{vmatrix} \quad (7)$$

Since (5) and (6) are equal, we have

$$b \begin{vmatrix} y & v \\ z & y \end{vmatrix} - v \begin{vmatrix} x & v \\ a & y \end{vmatrix} + m \begin{vmatrix} x & y \\ a & z \end{vmatrix} = v \begin{vmatrix} a & b \\ v & z \end{vmatrix} - y \begin{vmatrix} x & b \\ y & v \end{vmatrix} + m \begin{vmatrix} x & a \\ y & z \end{vmatrix}$$

i.e $b (y^2 – vz) – v (xy – va) + m (xz – ya) = v (az - bv) – y (xv – yb) + m (xz - ya)$

i.e $b (y^2 – vz - y^2 + v^2) – v (xy – va + az - xy) = 0$

i.e $b (– vz + v^2) – v (– va + az) = 0$

i.e $bv(v - z) – va (z - v) = 0$

i. e $b (v – z) + a (v – z) = 0$

i. e $(v - z) (a + b) \quad = 0$

Since $a + b$ can not be equal to zero, we obtain that $z - v$ (8)

Comparing eqns. (1) (8) and we obtain that the sum of the interior angles of triangle AEF is equal to two right angles. (9)

Since we have derived eqn. (9) with out assuming the fifth Euclidean postulate, eqn. (9) proves the parallel postulate. **[1 – 6]**

Discussion

In this work, to formulate equations (1) to (4) we have applied the fundamental operation of arithmetic. To coin equations (5) and (6) we have assumed the laws of matrices and determinants. These basic mathematical laws are consistent. So, equations (9) and (9) are also consistent. The result may be controversial. Future probes will explore new findings as in **[6 & 7]**

References

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