Comparision of Angles and Sides of Trapezium Using Matrices and lines

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I. ABSTRACT

Comparision of Angles and Sides of Trapezium.
A,B,C and D are the Vertices of Trapezium with AB——CD and AD=BC

In this program, it has been verified that
1. Angle A = Angle B
2. Angle C = Angle D
3. Diagonal AC = Diagonal BD
4. Angle ABC = Angle BAD

II. CONSIDERATIONS

It is given that AB is parallel to CD and AD=BC
Then consider the lengths of AD vector= 2.82, BC vecotor=2.82, so that AD=BC
And consider the length of AB vector=4 and CD vecotor=8, so that AB is parallel to CD. Then these considerations will generate the vertices as A=(-2, 2), B=(2, 2), C=(4, 0) and D=(-4,0)

III. PLOTTING TRAPEZIUM

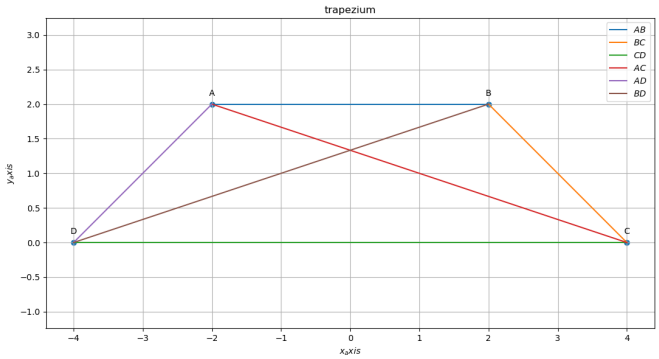

Fig. 1. trapezium

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IV. SOLUTION

A. Calculation of Angles A and B

Angle A = Angle BAD
=arccos[(A-B)dot(A-D)]/[(A-B).(A-D)]
=135
Angle B = Angle ABC
=arccos[(B-A)dot(B-C)]/[(B-A).(B-D)]
=135
Therefore Angle A = Angle B = 135

B. Calculation of Angles C and D

Angle C = Angle BCD
=arccos[(C-B)dot(C-D)]/[(C-B).(C-D)]
=45
Angle D = Angle ADC
=arccos[(D-A)dot(D-C)]/[(D-A).(D-C)]
=45
Therefore Angle C = Angle D = 45

C. Calculation of Diagonals AC and BD

Length of Diagonal AC = mod(A-C) =6.32
Length of Diagonal BD = mod(B-D) =6.32
Therefore Diagonal AC = Diagonal BD = 6.32

D. Comparing Triangles ABC and Traingle BAD

For Triangle ABC:
AB=4, BC= 2.82, AC=6.32 and Angle B = Angle ABC = 135
For Triangle BAD:
AB=4, AD= 2.82, BD=6.32 and Angle A = Angle BAD = 135
Therefore Traiangle ABC = Triangle BAD

V. SOFTWARE

1. Download the codes given in the link below and execute them.

https://github.com/meertabresali-FWC-IITH/project/blob/main/Assignment3/codes/main.c