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MATRIX ASSIGNMENT

0.1 Problem:

Construct a triangle ABC in which BC=7cm, $\angle B = 75^0$ and AB + AC = 13 cm.

0.2 Solution:

Theory:
Construct a triangle ABC in which BC = 7cm, $\angle B = 75^0$ and AB + AC = 13
To Prove:
i) Draw base BC = 7cm, and at point, B make an angle CBX of $\angle B = 75^0$ using a protractor.
ii) With B as center and radius BD = 13 cm, draw an arc to intersect ray BX at D.
iii) Join DC.
iv) Let's construct a perpendicular bisector of DC. With D and C as the center and radius greater than half of DC, draw arcs above and below the line DC to intersect ray BX at A.
v) Join AC.
ABC is the required triangle.
Verification:
On measuring we see that,BC = 7cm, $\angle B = 75^0$ and AB + AC = 13cm

0.3 TermuxCommands:

python3 matrix.py
To Prove:
Given BC length is a=7cm,so the coordinates of B are $\begin{pmatrix}0\\0\end{pmatrix}$
X1,Y1 respectively and the cordinates of C are, $\begin{pmatrix}a\\0\end{pmatrix}$
X3,Y3 respectively and also given the angle is $B = 75^0$,so by finding the coordinates of the other side we can form a required triangle.
Caluclating Other Coordinate:

Let the coordinates of A are X2,Y2 respectively.
Let A = $\begin{pmatrix}cos\theta\\sin\theta\end{pmatrix}$ Using the Cosine formula in ΔABC,
$b^2 = a^2 + c^2$ - 2accosB.
$\implies$ (b+c)(b-c)+7^2 - 2 $\times$ 7 $\times$ 0.25c
$\implies$ b-1.26c=3.76 1
Upon Simplifaction we get:-
b+c=13 2
and the above 2 equations can be written as:-
$\begin{pmatrix}1 & -1.26\\1 & 1\end{pmatrix}\begin{pmatrix}b\\c\end{pmatrix} = \begin{pmatrix}3.76\\13\end{pmatrix}$
from this, $\begin{pmatrix}b\\c\end{pmatrix} = \begin{pmatrix}5.333\\7.66\end{pmatrix}$
Thus,the vertices of Δ ABC are
A= 7.66 $\begin{pmatrix}cos75\\sin75\end{pmatrix}$,B= $\begin{pmatrix}0\\0\end{pmatrix}$,C= $\begin{pmatrix}7\\0\end{pmatrix}$
The below python code realizes the above construction:

https://github.com/manasareddy442002/fwc-moudle1/blob/5766de94c6f0b420a0ac6c40ab49c4418fa4df35/matrix-lines/matrix.py

0.4 Construction