Assignment 1

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Download all python codes from

https://github.com/grajanarsavva/Matrix−theory/codes

and latex-tikz codes from

https://github.com/grajanarsavva/Matrix−theory

1 Question No. 2.9

Draw $\triangle ABC$ in which $\angle C = 90°, \angle B = 30°$ and $a + b + c = 11$

2 Explanation

Given,

$$\angle C = 90°, \angle B = 30°, \angle A = 60° \text{ and } a + b + c = 11 \tag{2.0.1}$$

By using Sin Rule:

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \tag{2.0.2}$$

$$\implies b \sin C = c \sin B \tag{2.0.3}$$

$$b \sin 90 = c \sin 30 \tag{2.0.4}$$

$$\implies c = 2b \tag{2.0.5}$$

$$a \sin B = b \sin A \tag{2.0.6}$$

$$a \sin 30 = b \sin 60 \tag{2.0.7}$$

$$\implies a = \sqrt{3}b \tag{2.0.8}$$

Then, AX=B
which can be expressed as the matrix equation

$$\begin{pmatrix} 0 & -2 & 1 \\ 1 & -\sqrt{3} & 0 \\ 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} a \\ b \\ c \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 11 \end{pmatrix} \tag{2.0.9}$$

(2.0.9) by solving,we get values like,

$$\implies a = 4.02627944; \tag{2.0.10}$$

$$\implies b = 2.32457352; \tag{2.0.11}$$

$$\implies c = 4.64914704 \tag{2.0.12}$$

The Vertices of $\triangle ABC$ are

$$\mathbf{A} = \begin{pmatrix} 0 \\ c \end{pmatrix} = \begin{pmatrix} 0 \\ 4.64 \end{pmatrix} \tag{2.0.13}$$

$$\mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{2.0.14}$$

$$\mathbf{C} = \begin{pmatrix} a \\ 0 \end{pmatrix} = \begin{pmatrix} 4.02 \\ 0 \end{pmatrix} \tag{2.0.15}$$

Plot the $\triangle ABC$ is as follows:

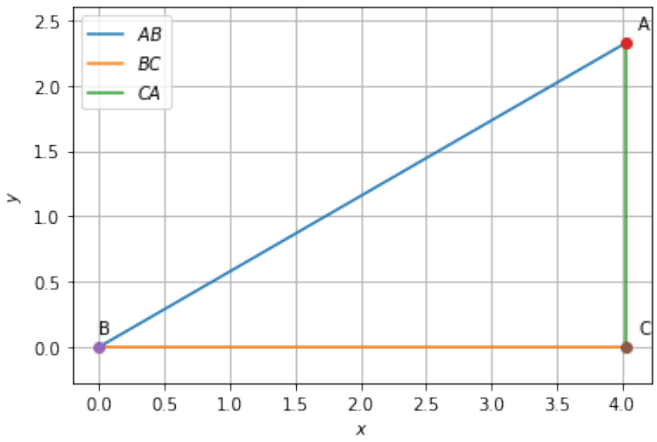

Fig. 2.1: $\triangle ABC$