Assignment 3

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Download all python codes from

https://github.com/Adarsh541/EE3900/blob/main/
Assignment2/codes/Assignment3.py

Download latex-tikz codes from

https://github.com/Adarsh541/EE3900/blob/main/
Assignment3/Assignment3.tex

1 PROBLEM(CONSTRUCTION Q2.3)

Draw JUMP with $JU = 3.5$, $UM = 4$, $MP = 5$, $PJ = 4.5$ and $PU = 6.5$

2 SOLUTION

The vertices $\mathbf{P}$ and $\mathbf{U}$ are

$$\mathbf{P} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{U} = \begin{pmatrix} PU \\ 0 \end{pmatrix} = \begin{pmatrix} 6.5 \\ 0 \end{pmatrix} \qquad (2.0.1)$$

Let $\angle UPM = \theta_1$ and $\angle JPU = \theta_2$

$$\cos\theta_1 = \frac{5^2 + 6.5^2 - 4^2}{2(5)(6.5)} \qquad (2.0.2)$$

$$= 0.7884 \qquad (2.0.3)$$

$$\implies \theta_1 = 37.958° \qquad (2.0.4)$$

$$\sin\theta_1 = 0.615 \qquad (2.0.5)$$

$$\cos\theta_2 = \frac{6.5^2 + 4.5^2 - 3.5^2}{2(6.5)(4.5)} \qquad (2.0.6)$$

$$= 0.8589 \qquad (2.0.7)$$

$$\implies \theta_2 = 30.798° \qquad (2.0.8)$$

$$\sin\theta_2 = 0.512 \qquad (2.0.9)$$

Now, the vertices $\mathbf{M}$ and $\mathbf{J}$ can be expressed in polar coordinate form as

$$\mathbf{M} = 5\begin{pmatrix} \cos\theta_1 \\ \sin\theta_1 \end{pmatrix} \qquad (2.0.10)$$

$$= \begin{pmatrix} 3.942 \\ 3.075 \end{pmatrix} \qquad (2.0.11)$$

$$\mathbf{J} = 4.5\begin{pmatrix} \cos\theta_2 \\ -\sin\theta_2 \end{pmatrix} \qquad (2.0.12)$$
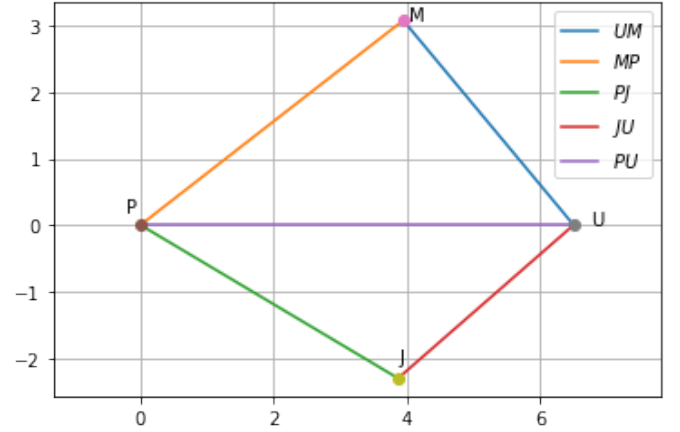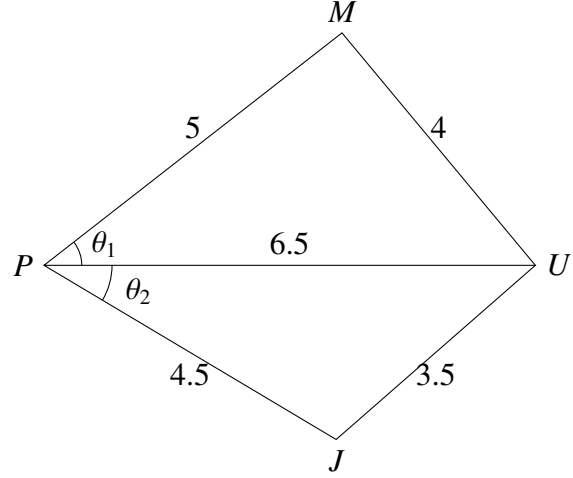
$$= \begin{pmatrix} 3.865 \\ -2.304 \end{pmatrix} \qquad (2.0.13)$$

Fig. 0: Plot using python