Assignment 1

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Find Python Codes from below link

https://github.com/Hruday−Beeravelli/INTERNSHIP−IITH−1/blob/main/Assignment1/Assignment1.py

and latex-tikz codes from

https://github.com/Hruday−Beeravelli/INTERNSHIP−IITH−1/blob/main/Assignment1/Assignment1.tex

1 Examples 1

1.1 Question 7

Find the distance between the following pairs of points

$$\begin{pmatrix} am_1^2 \\ 2am_1 \end{pmatrix}, \begin{pmatrix} am_2^2 \\ 2am_2 \end{pmatrix} \tag{1.1.1}$$

1.2 Solution

The distance between two vectors is given by

$$\|\mathbf{A}-\mathbf{B}\| = \sqrt{\left(\mathbf{A}-\mathbf{B}\right)^{\mathsf{T}} . \left(\mathbf{A}-\mathbf{B}\right)} \tag{1.2.1}$$

$$= \left\| \begin{pmatrix} am_1^2 \\ 2am_1 \end{pmatrix} - \begin{pmatrix} am_2^2 \\ 2am_2 \end{pmatrix} \right\| \tag{1.2.2}$$

$$= \left\| \begin{pmatrix} am_1^2 - am_2^2 \\ 2am_1 - 2am_2 \end{pmatrix} \right\| \tag{1.2.3}$$

$$= \sqrt{\begin{pmatrix} am_1^2 - am_2^2 \\ 2am_1 - 2am_2 \end{pmatrix}^{\mathsf{T}} \begin{pmatrix} am_1^2 - am_2^2 \\ 2am_1 - 2am_2 \end{pmatrix}} \tag{1.2.4}$$

$$= \sqrt{\begin{pmatrix} am_1^2 - am_2^2 & 2am_1 - 2am_2 \end{pmatrix} \begin{pmatrix} am_1^2 - am_2^2 \\ 2am_1 - 2am_2 \end{pmatrix}} \tag{1.2.5}$$

$$= \sqrt{\left(am_1^2 - am_2^2\right)^2 + \left(2am_1 - 2am_2\right)^2} \tag{1.2.6}$$

$$= a\sqrt{\left(m_1^2 - m_2^2\right)^2 + 4\left(m_1 - m_2\right)^2} \tag{1.2.7}$$

Distance between $(am_1^2, 2am_1)$ and $(am_2^2, 2am_2)$ is

$$= a\sqrt{\left(m_1^2 - m_2^2\right)^2 + 4\left(m_1 - m_2\right)^2} \tag{1.2.8}$$