

Assignment 2

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Download all python codes from

https://github.com/Bharat437/Matrix_Theory/tree/master/Assignment2/Codes

and latex-tikz codes from

https://github.com/Bharat437/Matrix_Theory/tree/master/Assignment2

1 QUESTION

simplify

$$\cos \theta \begin{pmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{pmatrix} + \sin \theta \begin{pmatrix} \sin \theta & -\cos \theta \\ \cos \theta & \sin \theta \end{pmatrix}$$

2 EXPLANATION

$$\cos \theta \begin{pmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{pmatrix} + \sin \theta \begin{pmatrix} \sin \theta & -\cos \theta \\ \cos \theta & \sin \theta \end{pmatrix} \quad (2.0.1)$$

$$\Rightarrow \cos \theta \begin{pmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{pmatrix} \quad (2.0.2)$$

$$+ \cos(270 + \theta) \begin{pmatrix} \cos(270 + \theta) & \sin(270 + \theta) \\ -\sin(270 + \theta) & \cos(270 + \theta) \end{pmatrix} \\ \Rightarrow \begin{pmatrix} \cos^2 \theta & \cos \theta \sin \theta \\ -\cos \theta \sin \theta & \cos^2 \theta \end{pmatrix} \quad (2.0.3)$$

$$+ \begin{pmatrix} \cos^2(270 + \theta) & \cos(270 + \theta) \sin(270 + \theta) \\ -\cos(270 + \theta) \sin(270 + \theta) & \cos^2(270 + \theta) \end{pmatrix} \\ \Rightarrow \begin{pmatrix} \frac{1+\cos 2\theta}{2} & \frac{\sin 2\theta}{2} \\ -\frac{\sin 2\theta}{2} & \frac{1+\cos 2\theta}{2} \end{pmatrix} \quad (2.0.4)$$

$$+ \begin{pmatrix} \frac{1+\cos(540+2\theta)}{2} & \frac{\sin(540+2\theta)}{2} \\ -\frac{\sin(540+2\theta)}{2} & \frac{1+\cos(540+2\theta)}{2} \end{pmatrix} \\ \Rightarrow \begin{pmatrix} \frac{1+\cos 2\theta}{2} & \frac{\sin 2\theta}{2} \\ -\frac{\sin 2\theta}{2} & \frac{1+\cos 2\theta}{2} \end{pmatrix} + \begin{pmatrix} \frac{1-\cos 2\theta}{2} & \frac{-\sin 2\theta}{2} \\ \frac{\sin 2\theta}{2} & \frac{1-\cos 2\theta}{2} \end{pmatrix} \quad (2.0.5)$$

$$\Rightarrow \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = \mathbf{I} \quad (2.0.6)$$

Hence it is simplified.