Assignment 4

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The link to the solution is

https://github.com/Adarsh1310/EE5609

Abstract—**This documents solves a problem based on determinant.**

1 PROBLEM

Show That

Prove that $\begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix}$ is independent of θ

2 SOLUTION

$$\begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix} \tag{2.0.1}$$

Now, Solving the determinant:-

$$= x(-x^2 - 1) - \sin\theta(-x\sin\theta - \cos\theta) + \cos\theta(-\sin\theta + x\cos\theta) \tag{2.0.2}$$

$$= -x^3 - x + x\sin^2\theta + \sin\theta\cos\theta - \sin\theta\cos\theta + x\cos^2\theta \tag{2.0.3}$$

$$= -x^3 - x + x\sin^2\theta + x\cos^2\theta \tag{2.0.4}$$

$$= -x^3(Since, \sin^2\theta + \cos^2\theta = 1) \tag{2.0.5}$$

Hence, the determinant is independent of θ.