

SM5083

Assignment Number 02

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1. CHAPTER III MISCELLANEOUS EXAMPLE IV Q.1

1.1. show that the equation of line joining $(r_1, \theta_1), (r_2, \theta_2)$ is

$$\frac{1}{r} \sin(\theta_1 - \theta_2) = \frac{1}{r_1} \sin(\theta - \theta_2) + \frac{1}{r_2} \sin(\theta - \theta_1)$$

Solution:

let

$$\begin{vmatrix} r \cos \theta & r_1 \cos \theta_1 & r_2 \cos \theta_2 \\ r \sin \theta & r_1 \sin \theta_1 & r_2 \sin \theta_2 \\ 1 & 1 & 1 \end{vmatrix} = 0 \quad (1.1.1)$$

$$\begin{aligned} r_1 r_2 (\cos \theta_1 \sin \theta_2 - \sin \theta_1 \cos \theta_2) - r r_2 (\cos \theta \sin \theta_2 - \sin \theta \cos \theta_2) \\ + r r_1 (\cos \theta \sin \theta_1 - \sin \theta \cos \theta_1) = 0 \end{aligned} \quad (1.1.2)$$

$$-r_1 r_2 \sin(\theta_1 - \theta_2) + r r_2 \sin(\theta - \theta_2) - r r_1 \sin(\theta - \theta_1) = 0 \quad (1.1.3)$$

now arranging the equation we get

$$\frac{1}{r} \sin(\theta_1 - \theta_2) = \frac{1}{r_1} \sin(\theta - \theta_2) + \frac{1}{r_2} \sin(\theta - \theta_1) \quad (1.1.4)$$