Assignment-3

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***Abstract*—This document contains the procedure to evaluate the determinant**

Download the python code from

https://github.com/ankuraditya13/EE5609–Assignment3

and latex-file codes from

https://github.com/ankuraditya13/EE5609–Assignment3

1 Problem

Evaluate the following determinant

$$\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix} = 0 \tag{1.0.1}$$

2 Solution

$$\text{Let, } \left|\mathbf{A}\right| = \begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix} \tag{2.0.1}$$

Applying row transformation in above determinant we get,

$$\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix} \xleftrightarrow{R_1 \leftarrow R_1+R_2} \begin{vmatrix} a-c & b-a & c-b \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix} \tag{2.0.2}$$

$$\xleftrightarrow{R_1 \leftarrow R_1+R_3} \begin{vmatrix} 0 & 0 & 0 \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix} \tag{2.0.3}$$

From equation (2.0.3) one of the row of $\left|\mathbf{A}\right|$ is zero

$$\implies \left|\mathbf{A}\right| = 0 \tag{2.0.4}$$