

# Assignment 4

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**Abstract**—This is a simple document explaining how to simplify a determinant.

Download all and latex-tikz codes from

svn co <https://github.com/gadepall/school/trunk/ncert/geometry/figs>

## 1 PROBLEM

Prove that,

$$\begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} = 2 \begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix}$$

## 2 SOLUTION

$$\begin{aligned} & \begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} \\ \xleftrightarrow{R_1 \leftarrow R_1 + R_2 + R_3} & 2 \begin{vmatrix} (a+b+c) & (p+q+r) & (x+y+z) \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} \\ \xleftrightarrow{\begin{matrix} R_3 \leftarrow R_3 - R_1 \\ R_2 \leftarrow R_2 - R_1 \end{matrix}} & 2 \begin{vmatrix} (a+b+c) & (p+q+r) & (x+y+z) \\ -b & -q & -y \\ -c & -r & -z \end{vmatrix} \\ \xleftrightarrow{R_1 \leftarrow R_1 + R_2 + R_3} & (-1) \times (-1) \times 2 \begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix} \\ & (2.0.1) \end{aligned}$$

Hence, the above problem statement is proved.

2.1. Verification of the above problem using python code.

codes/det\_check.py