Chapter 6 Determinants Ex 6.2 Q41

$$LHS = \begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+a & 1 \\ 1 & 1 & 1+a \end{vmatrix}$$

$$= \begin{vmatrix} 3+a & 3+a & 3+a \\ 1 & 1+a & 1 \\ 1 & 1 & 1+a \end{vmatrix}$$

$$= (3+a)\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+a & 1 \\ 1 & 1 & 1+a \end{vmatrix}$$

$$= (3+a)\begin{vmatrix} 1 & 1 & 1 \\ 0 & a & 0 \\ 0 & 1 & a \end{vmatrix}$$

$$= (3+a)a^2$$

$$= a^3 + 3a^2$$

$$= RHS$$

Chapter 6 Determinants Ex 6.2 Q42

L.H.S.,

$$\begin{vmatrix} 2y & y-z-x & 2y \\ 2z & 2z & z-x-y \\ x-y-z & 2x & 2x \end{vmatrix}$$

$$= \begin{vmatrix} x+y+z & x+y+z & x+y+z \\ 2z & 2z & z-x-y \\ x-y-z & 2x & 2x \end{vmatrix} [R_1 = R_1 + R_2 + R_3]$$

$$= (x+y+z)\begin{vmatrix} 1 & 1 & 1 \\ 2z & 2z & z-x-y \\ x-y-z & 2x & 2x \end{vmatrix}$$

$$= (x+y+z)\begin{vmatrix} 1 & 0 & 0 \\ 2z & 0 & -x-y-z \\ x-y-z & x+y+z & x+y+z \end{vmatrix} [C_2 = C_2 - C_1, C_3 = C_3 - C_1]$$

$= (x+y+z)[1\{0+(x+y+z)(x+y+z)\}]$

$= (x+y+z)^3$

= R.H.S.

Hence Proved

Chapter 6 Determinants Ex 6.2 Q43

$$\begin{vmatrix} y+z & x & y \\ z+x & z & x \\ x+y & y & z \end{vmatrix}$$

$$= \begin{vmatrix} 2(y+z+x) & y+z+x & y+z+x \\ z+x & z & x \\ x+y & y & z \end{vmatrix}$$

$$= (x+y+z)\begin{vmatrix} 2 & 1 & 1 \\ z+x & z & x \\ x+y & y & z \end{vmatrix}$$

$$= (x+y+z)\begin{vmatrix} 0 & 1 & 1 \\ z+x-z-x & z & x \\ x+y-y-z & y & z \end{vmatrix}$$

$$= (x+y+z)\begin{vmatrix} 0 & 1 & 1 \\ 0 & z & x \\ x-z & y & z \end{vmatrix}$$

$$= (x+y+z)(x-z)^2$$

$$= RHS$$

Chapter 6 Determinants Ex 6.2 Q44

L.H.S. =

$$\begin{vmatrix} a+x & y & z \\ x & a+y & z \\ x & y & a+z \end{vmatrix}$$

$$= \begin{vmatrix} a+x+y+z & y & z \\ a+x+y+z & a+y & z \\ a+x+y+z & x & a+z \end{vmatrix} [C_1 = C_1 + C_2 + C_3]$$

$$= (a+x+y+z)\begin{vmatrix} 1 & y & z \\ 1 & a+y & z \\ 1 & x & a+z \end{vmatrix}$$

$$= (a+x+y+z)\begin{vmatrix} 1 & y & z \\ 0 & a & 0 \\ 0 & x-y & a \end{vmatrix} [R_2 \to R_2 - R_1, R_3 \to R_3 - R_1]$$

$$= (a+x+y+z)[1(a^2-0)]$$

$$= a^2(a+x+y+z)$$

= R.H.S.

Hence Proved.

********** END **********