(%i1) load('clifford);

package name: clifford.mac

author:

Dimiter Prodanov

version:

v20

Recommended location: share/contrib

last update: 20 June 2016

(%o1)

"C:/Dropbox/maxima/clifford.mac"

(%i2) clifford(e,3);

$$[1,1,1] \tag{\%o2}$$

(%i3) EE:cons(1, %elements);

$$[1, e_1, e_2, e_3, e_1.e_2, e_1.e_3, e_2.e_3, e_1.e_2.e_3] \tag{EE}$$

Cl(3,0,0)

(%i4) mtable1o(%elements);

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & 0 & e_1.e_2 & e_1.e_3 & 0 & 0 & e_1.e_2.e_3 & 0 \\ e_2 & -e_1.e_2 & 0 & e_2.e_3 & 0 & -e_1.e_2.e_3 & 0 & 0 \\ e_3 & -e_1.e_3 & -e_2.e_3 & 0 & e_1.e_2.e_3 & 0 & 0 & 0 \\ e_1.e_2 & 0 & 0 & e_1.e_2.e_3 & 0 & 0 & 0 & 0 \\ e_1.e_3 & 0 & -e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 \\ e_2.e_3 & e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 & 0 \\ e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \tag{\%o4}$$

(%i5) mtable1i(%elements);

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & 1 & 0 & 0 & e_2 & e_3 & 0 & e_2.e_3 \\ e_2 & 0 & 1 & 0 & -e_1 & 0 & e_3 & -e_1.e_3 \\ e_3 & 0 & 0 & 1 & 0 & -e_1 & -e_2 & e_1.e_2 \\ e_1.e_2 & -e_2 & e_1 & 0 & -1 & 0 & 0 & -e_3 \\ e_1.e_3 & -e_3 & 0 & e_1 & 0 & -1 & 0 & e_2 \\ e_2.e_3 & 0 & -e_3 & e_2 & 0 & 0 & -1 & -e_1 \\ e_1.e_2.e_3 & e_2.e_3 & -e_1.e_3 & e_1.e_2 & -e_3 & e_2 & -e_1 & -1 \end{pmatrix} \quad (\%o5)$$

(%i6) mtable2();

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & 1 & e_1.e_2 & e_1.e_3 & e_2 & e_3 & e_1.e_2.e_3 & e_2.e_3 \\ e_2 & -e_1.e_2 & 1 & e_2.e_3 & -e_1 & -e_1.e_2.e_3 & e_3 & -e_1.e_3 \\ e_3 & -e_1.e_3 & -e_2.e_3 & 1 & e_1.e_2.e_3 & -e_1 & -e_2 & e_1.e_2 \\ e_1.e_2 & -e_2 & e_1 & e_1.e_2.e_3 & -1 & -e_2.e_3 & e_1.e_3 & -e_3 \\ e_1.e_3 & -e_3 & -e_1.e_2.e_3 & e_1 & e_2.e_3 & -1 & -e_1.e_2 & e_2 \\ e_2.e_3 & e_1.e_2.e_3 & -e_3 & e_2 & -e_1.e_3 & e_1.e_2 & -1 & -e_1 \\ e_1.e_2.e_3 & e_2.e_3 & -e_1.e_3 & e_1.e_2 & -e_3 & e_2 & -e_1 & -1 \end{pmatrix} \quad (\%o6)$$

Cl(1,1,1)

(%i7) clifford(e,1,1,1);

$$[1, -1, 0] \quad (\%o7)$$

(%i8) mtable1o(%elements);

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & 0 & e_1.e_2 & e_1.e_3 & 0 & 0 & e_1.e_2.e_3 & 0 \\ e_2 & -e_1.e_2 & 0 & e_2.e_3 & 0 & -e_1.e_2.e_3 & 0 & 0 \\ e_3 & -e_1.e_3 & -e_2.e_3 & 0 & e_1.e_2.e_3 & 0 & 0 & 0 \\ e_1.e_2 & 0 & 0 & e_1.e_2.e_3 & 0 & 0 & 0 & 0 \\ e_1.e_3 & 0 & -e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 \\ e_2.e_3 & e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 & 0 \\ e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \quad (\%o8)$$

(%i9) mtable1i(%elements);

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & 1 & 0 & 0 & e_2 & e_3 & 0 & e_2.e_3 \\ e_2 & 0 & -1 & 0 & e_1 & 0 & -e_3 & e_1.e_3 \\ e_3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ e_1.e_2 & -e_2 & -e_1 & 0 & 1 & 0 & 0 & e_3 \\ e_1.e_3 & -e_3 & 0 & 0 & 0 & 0 & 0 & 0 \\ e_2.e_3 & 0 & e_3 & 0 & 0 & 0 & 0 & 0 \\ e_1.e_2.e_3 & e_2.e_3 & e_1.e_3 & 0 & e_3 & 0 & 0 & 0 \end{pmatrix} \qquad (\%o9)$$

(%i10) mtable2();

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & 1 & e_1.e_2 & e_1.e_3 & e_2 & e_3 & e_1.e_2.e_3 & e_2.e_3 \\ e_2 & -e_1.e_2 & -1 & e_2.e_3 & e_1 & -e_1.e_2.e_3 & -e_3 & e_1.e_3 \\ e_3 & -e_1.e_3 & -e_2.e_3 & 0 & e_1.e_2.e_3 & 0 & 0 & 0 \\ e_1.e_2 & -e_2 & -e_1 & e_1.e_2.e_3 & 1 & -e_2.e_3 & -e_1.e_3 & e_3 \\ e_1.e_3 & -e_3 & -e_1.e_2.e_3 & 0 & e_2.e_3 & 0 & 0 & 0 \\ e_2.e_3 & e_1.e_2.e_3 & e_3 & 0 & e_1.e_3 & 0 & 0 & 0 \\ e_1.e_2.e_3 & e_2.e_3 & e_1.e_3 & 0 & e_3 & 0 & 0 & 0 \end{pmatrix} \qquad (\%o10)$$

Cl(0,2,1)

(%i11) clifford(e,0,2,1);

$$[-1,-1,0] \qquad (\%o11)$$

(%i12) mtable1o(%elements);

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & 0 & e_1.e_2 & e_1.e_3 & 0 & 0 & e_1.e_2.e_3 & 0 \\ e_2 & -e_1.e_2 & 0 & e_2.e_3 & 0 & -e_1.e_2.e_3 & 0 & 0 \\ e_3 & -e_1.e_3 & -e_2.e_3 & 0 & e_1.e_2.e_3 & 0 & 0 & 0 \\ e_1.e_2 & 0 & 0 & e_1.e_2.e_3 & 0 & 0 & 0 & 0 \\ e_1.e_3 & 0 & -e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 \\ e_2.e_3 & e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 & 0 \\ e_1.e_2.e_3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \qquad (\%o12)$$

(%i13) mtable1i(%elements);

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & -1 & 0 & 0 & -e_2 & -e_3 & 0 & -e_2.e_3 \\ e_2 & 0 & -1 & 0 & e_1 & 0 & -e_3 & e_1.e_3 \\ e_3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ e_1.e_2 & e_2 & -e_1 & 0 & -1 & 0 & 0 & -e_3 \\ e_1.e_3 & e_3 & 0 & 0 & 0 & 0 & 0 & 0 \\ e_2.e_3 & 0 & e_3 & 0 & 0 & 0 & 0 & 0 \\ e_1.e_2.e_3 & -e_2.e_3 & e_1.e_3 & 0 & -e_3 & 0 & 0 & 0 \end{pmatrix} \quad (\%o13)$$

(%i14) mtable2();

$$\begin{pmatrix} 1 & e_1 & e_2 & e_3 & e_1.e_2 & e_1.e_3 & e_2.e_3 & e_1.e_2.e_3 \\ e_1 & -1 & e_1.e_2 & e_1.e_3 & -e_2 & -e_3 & e_1.e_2.e_3 & -e_2.e_3 \\ e_2 & -e_1.e_2 & -1 & e_2.e_3 & e_1 & -e_1.e_2.e_3 & -e_3 & e_1.e_3 \\ e_3 & -e_1.e_3 & -e_2.e_3 & 0 & e_1.e_2.e_3 & 0 & 0 & 0 \\ e_1.e_2 & e_2 & -e_1 & e_1.e_2.e_3 & -1 & e_2.e_3 & -e_1.e_3 & -e_3 \\ e_1.e_3 & e_3 & -e_1.e_2.e_3 & 0 & -e_2.e_3 & 0 & 0 & 0 \\ e_2.e_3 & e_1.e_2.e_3 & e_3 & 0 & e_1.e_3 & 0 & 0 & 0 \\ e_1.e_2.e_3 & -e_2.e_3 & e_1.e_3 & 0 & -e_3 & 0 & 0 & 0 \end{pmatrix} \quad (\%o14)$$