LAGA_chapter07.01problem7.1.1.wxm (LAGA examples)

A test document for Geometric Algebra with wxMaxima
contains...
Initialization
Loading of functions (intrinsic and GA specific)
Pseudoscalar definition (specifies the space dimension) and
calculation of the inverse pseudoscalar used to generate the dual of a multivector
Enumeration of the standard basis for the specified dimension

Problems 7.1 in Project

Reference book...Linear and Geometric Algebra (LAGA)
by Alan Macdonald

Initialization

```
(%i42) ext:["wxm"]$
       file_type_maxima:append(ext,file_type_maxima)$
       batchload("initialize_fns")$
```

the pseudoscalar and its inverse
the lowest useable dimension pseudoscalar should be {e1,e2} i.e. Plen = 2
e.g. for four dimensions edit Pseudos:{e1,e2,e3}$ to Pseudos:{e1,e2,e3,e4}$

```
(%i1) Pseudos:{e1,e2,e3}$
      Pvar:listofvars(Pseudos)$
      Plen:length(Pvar)$
      I:Pseudos$
      ni:(Plen-1)*Plen/2$
      Ii:(-1)^ni*I$
      kill(ni)$
      ldisplay(Pvar)$

 (%t8) Pvar=[e1,e2,e3]

(%i9) batchload("initialize_lsts")$

 (%t9) lstblds=[[{e1},{e2},{e3}],[{e1,e2},{e1,e3},{e2,e3}],[{e1,e2,e3}]]
(%t10) allblds=[{e1},{e2},{e3},{e1,e2},{e1,e3},{e2,e3},{e1,e2,e3}]
(%t11) invblds=[{e1},{e2},{e3},-{e1,e2},-{e1,e3},-{e2,e3},-{e1,e2,e3}]
```

end of Initialization

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the shape of the subspace A is not relevant; find the norm of the planar circle

```
(%i12) P:{e1}&^(3*{e2}+4*{e3})$
       areaP:normod(P)$
       ldisplay(P,areaP)$

(%t14)/R/ P=4*{e1,e3}+3*{e1,e2}
(%t15) areaP=5
```

find the subspace, A with area = 10, using the normalized plane

```
(%i16) A:10*P/areaP$
       ldisplay(A)$

(%t17)/R/ A=8*{e1,e3}+6*{e1,e2}
```

find the inverse of the blade, B as Bm1 (B to the power -1)

```
(%i18) B:{e1}~*{e2}$
       Bm1:mvrev(B)/normod(B)^2$
       ldisplay(B,Bm1)$

(%t20) B={e1,e2}
(%t21)/R/ Bm1=-{e1,e2}
```

find the projection of blade A onto blade B as P = (A.B)/B and its norm (area)

```
(%i22) P:(A&.B)&*Bm1$
       normod(P)$
       ldisplay(P,%)$

(%t24)/R/ P=6*{e1,e2}
(%t25) %=6
```