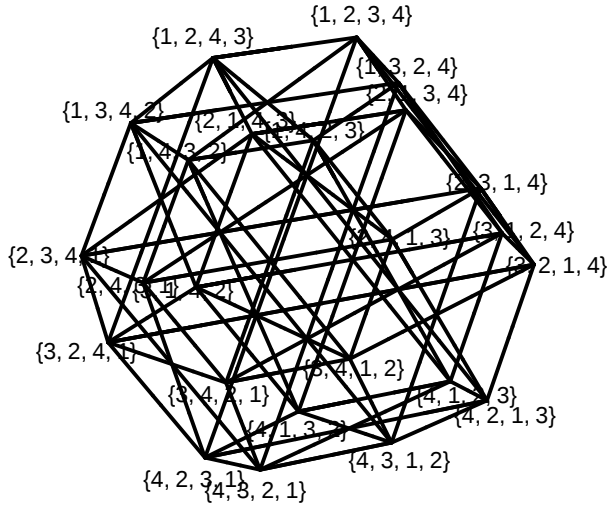
In[1]:=
```
n = 4;
(* macierz Cartana, słuzy do ortogonalnego rzutowania R4→ R3 *)
cartan = {{-1, 1, 1, -1}, {1, -1, 1, -1}, {1, 1, -1, -1}(*{-1,-1,-1,-1}*)};
rys[a_] := cartan.a
sasiedzi[uu_, vv_, ww_, zz_] := {{vv, uu, ww, zz}, {uu, ww, vv, zz}, {ww, vv, uu, zz},
  {zz, vv, ww, uu}, {uu, zz, ww, vv}, {uu, vv, zz, ww}}
roznica[a_, b_] := Complement[{a}, sasiedzi @@ b] == {}
```

In[6]:=
```
wierzcholki = Permutations[IdentityMatrix[4]];
krawedzie = Select[
    Subsets[wierzcholki, {2}],
    roznica[#[[1]], #[[2]]] == True &];
mu = {w + x + y + z, w + y + z, w + z, w};
wierzcholkiw = Table[rys[mu.a], {a, wierzcholki}];
krawedziew = Table[{rys[mu.kr[[1]]], rys[mu.kr[[2]]]}, {kr, krawedzie}];
```

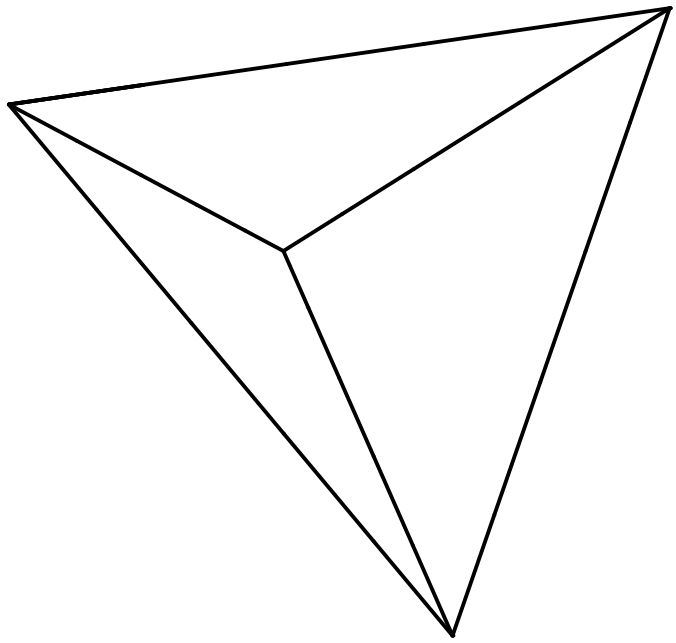
In[40]:=
```
momentpoly[x0_, y0_, z0_] := (
  f[a_] := a /. {x → x0, y → y0, z → z0};
  odcinek[a_] := Graphics3D[{Thick, Line[{f[a][[1]], f[a][[2]]}]}];
  podpis[nr_] :=
   Graphics3D[Text[Style[{1, 2, 3, 4}.wierzcholki[[nr]], Medium, Black],
     1.1 f[wierzcholkiw[[nr]]]]];
  Show[Union[Table[odcinek[a], {a, krawedziew}],
    Table[podpis[nr], {nr, 1, Length[wierzcholki]}]], Boxed → False])
(*Manipulate[momentpoly[x0,y0,z0],{{x0,3},0,10},{{y0,2},0,10},
 {{z0,2},0,10},ControlPlacement→Right]*)
momentpoly[1, 1, 1]
```

Out[41]=

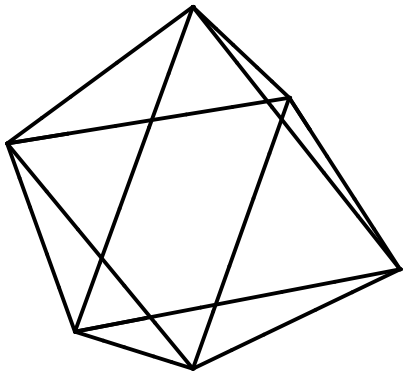


In[60]:=
```
momentpolyk[x0_, y0_, z0_] := (
  f[a_] := a /. {x → x0, y → y0, z → z0};
  odcinek[a_] := Graphics3D[{Thick, Line[{f[a][[1]], f[a][[2]]}]}];
  Show[Union[Table[odcinek[a], {a, krawedziew}]], Boxed → False])
wielosciany = {{0, 0, 1}, {0, 1, 0}, {0, 1, 1}, {0, 1, 3}, {0, 3, 1},
   {1, 0, 0}, {1, 0, 1}, {1, 0, 3}, {1, 1, 0}, {1, 1, 1}, {1, 1, 3}, {1, 3, 0},
   {1, 3, 1}, {1, 3, 3}, {3, 0, 1}, {3, 1, 0}, {3, 1, 1}, {3, 1, 3}, {3, 3, 1}};
Do[Print["Polaryzacja", wiel];
 Print[momentpolyk @@ wiel];
 Print[" "], {wiel, wielosciany}]
```

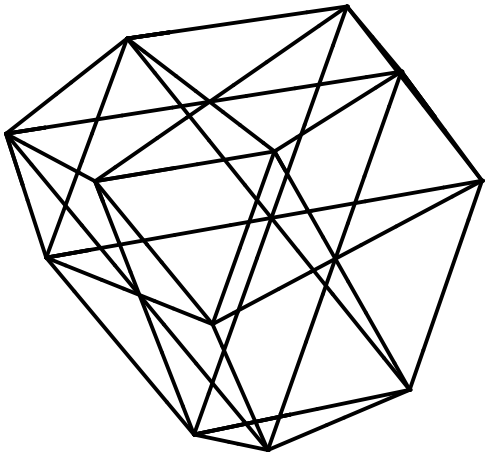
```
Polaryzacja{0, 0, 1}
```



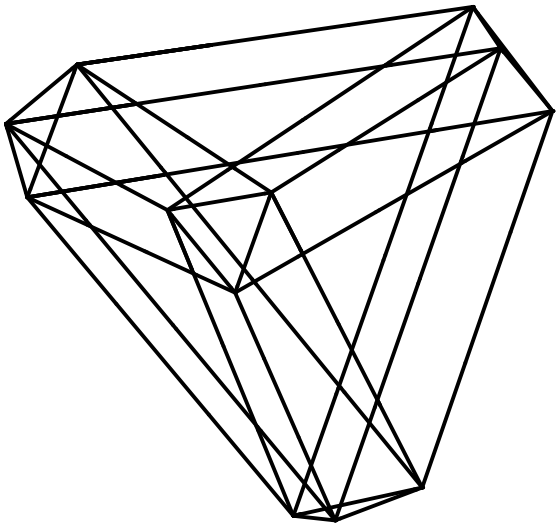
```
Polaryzacja{0, 1, 0}
```



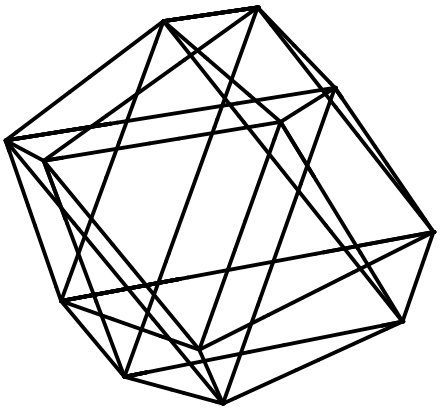
Polaryzacja{0, 1, 1}



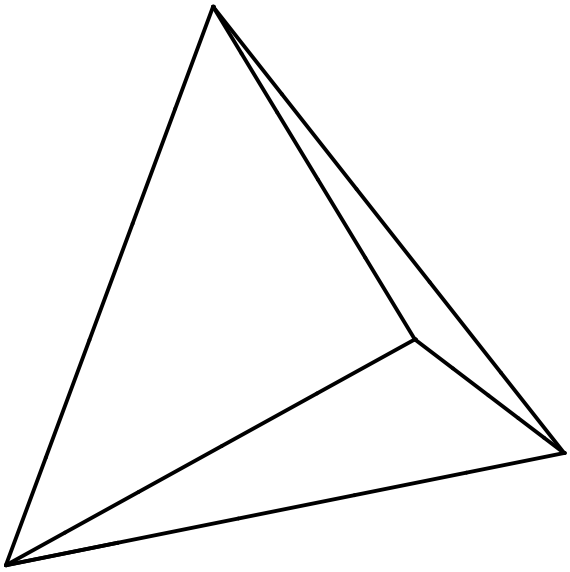
Polaryzacja{0, 1, 3}



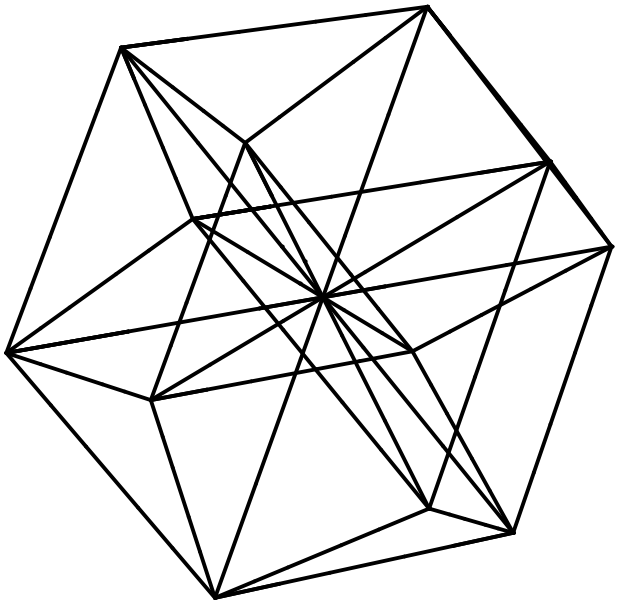
```
Polaryzacja{0, 3, 1}
```



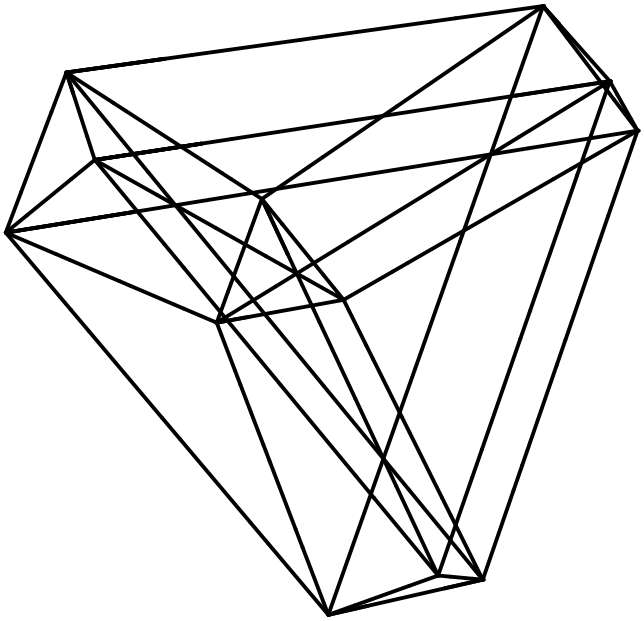
```
Polaryzacja{1, 0, 0}
```



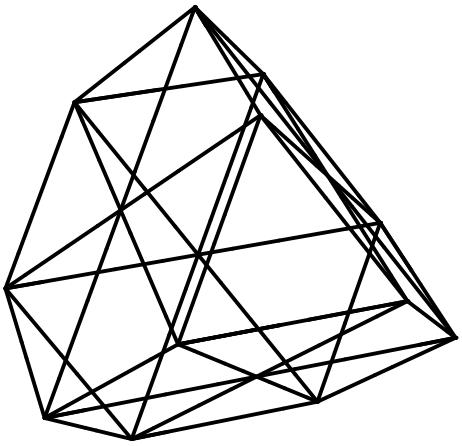
Polaryzacja{1, 0, 1}



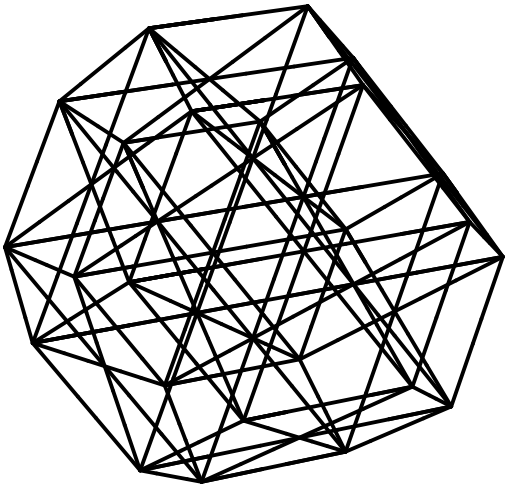
Polaryzacja{1, 0, 3}



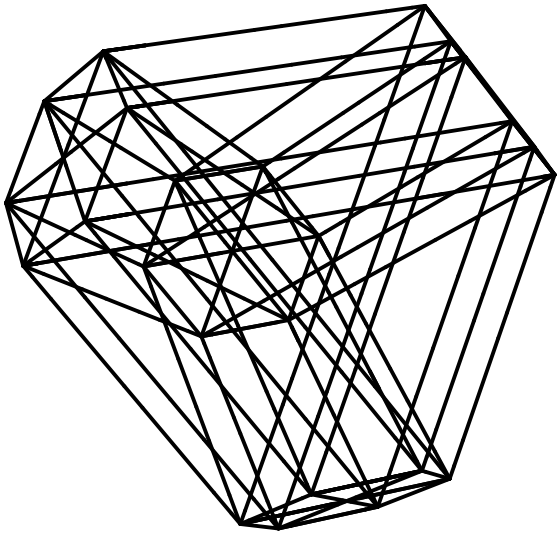
Polaryzacja{1, 1, 0}



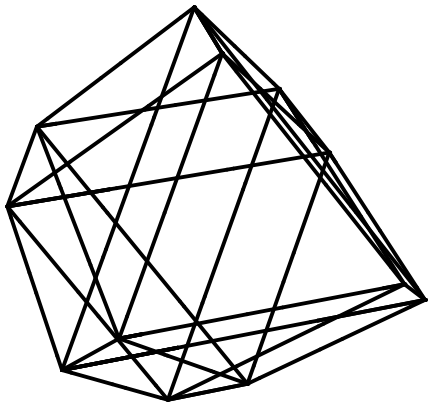
Polaryzacja{1, 1, 1}



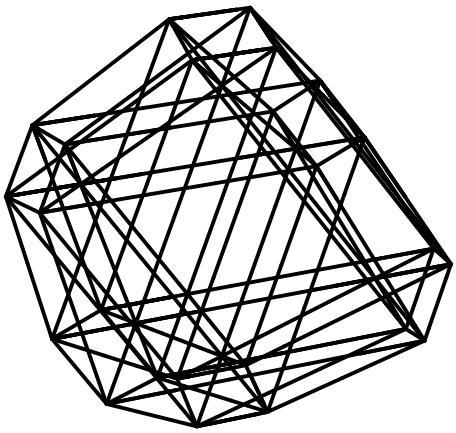
Polaryzacja{1, 1, 3}



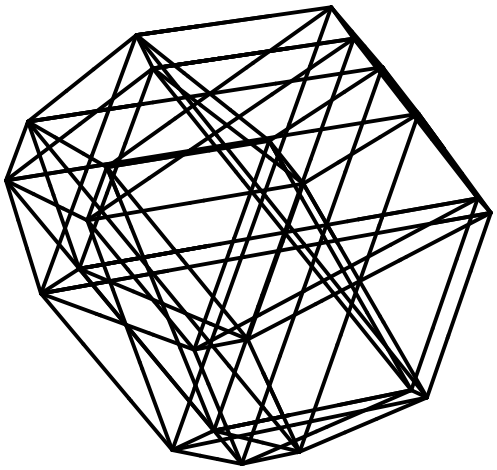
Polaryzacja{1, 3, 0}



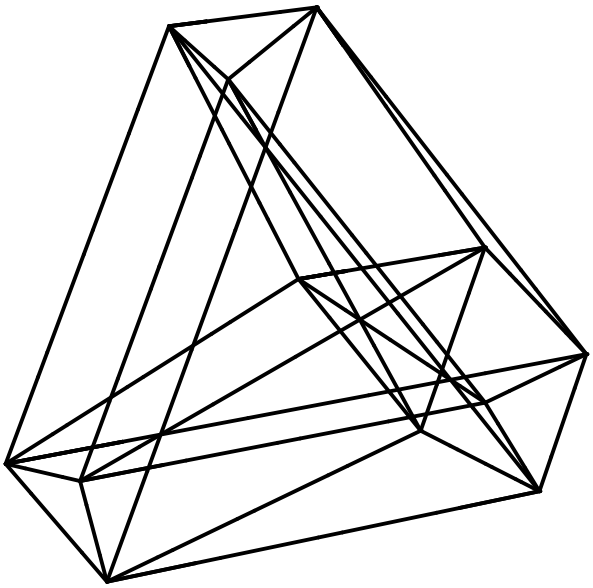
Polaryzacja{1, 3, 1}



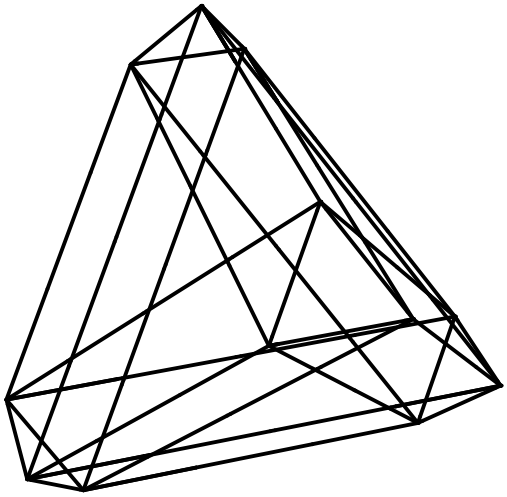
Polaryzacja{1, 3, 3}



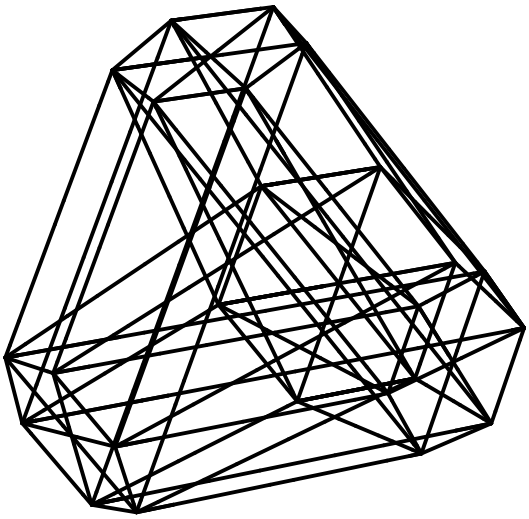
Polaryzacja{3, 0, 1}



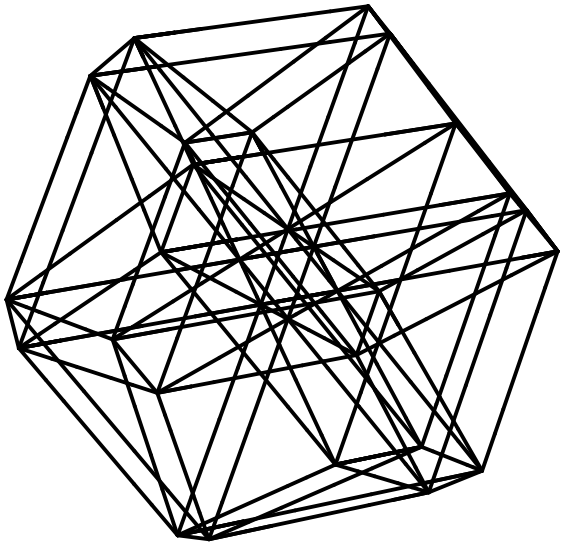
Polaryzacja{3, 1, 0}



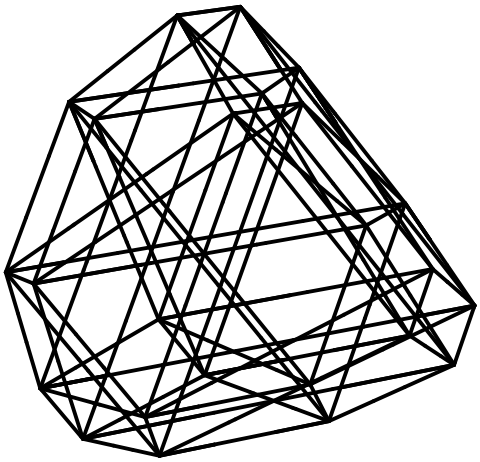
```
Polaryzacja{3, 1, 1}
```



```
Polaryzacja{3, 1, 3}
```

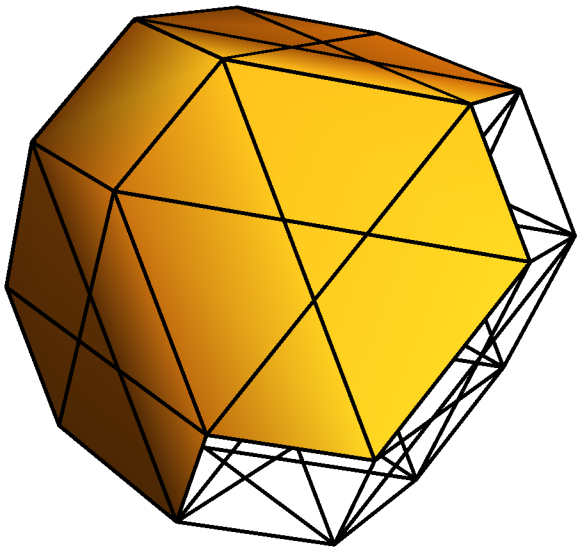


Polaryzacja{3, 3, 1}



In[49]:=
```
momentpolyp[x0_, y0_, z0_] := (
  f[a_] := a /. {x → x0, y → y0, z → z0};
  odcinek[a_] := Graphics3D[{Thick, Line[{f[a][[1]], f[a][[2]]}]}];
  podpis[nr_] := Graphics3D[
    Text[Style[wierzcholki[[nr]], Medium, Black], 1.1 f[wierzcholkiw[[nr]]]]];
  Show[Union[Table[odcinek[a], {a, krawedziew}],
    {ListPlot3D[Table[f[wi], {wi, wierzcholkiw}], Mesh → None]}],
   Boxed → False, PlotRange → All])
momentpolyp[
 1,
 1.5,
 1]
```

Out[50]=



```
momentpolyp[1, 0, 2]
```