

■ Direct computation of matrix representations of Hodge operators (without using KappaLib)

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Bin[k_] := Module[{t},
  t = {{1, 2}, {1, 3}, {1, 4}, {3, 4}, {4, 2}, {2, 3}};
  t[[k]]
];

Bin[2]

{1, 3}

L[g_] := Module[{},
  Table[
    Sum[g[[Bin[i][[1]]]][[a]] g[[Bin[i][[2]]]][[b]]
      Signature[{a, b, Bin[j][[1]], Bin[j][[2]]}], {a, 1, 4}, {b, 1, 4}], {i, 1, 6}, {j, 1, 6}]
];

g = DiagonalMatrix[{1, 1, 1, 1}];
L[g] // MatrixForm


$$\begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix}$$


g = DiagonalMatrix[{1, -1, -1, 1}];
L[g] // MatrixForm


$$\begin{pmatrix} 0 & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix}$$


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