

```
In[*]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\2023-01"]
```

```
Out[*]= C:\drorbn\AcademicPensieve\2023-01
```

```
In[*]:= t* ^= t^-1
```

```
In[*]:= a*
```

```
Out[*]= Conjugate[a]
```

```
In[*]:= a* /. a -> 1 + t^3
```

```
Out[*]= 1 + 1/t^3
```

```
In[*]:= <c_, d_> := Simplify@Module[{f},
```

```
Expand[c (d /. {t -> t*, e_j_ -> f_j})] /. e_i_ f_j_ -> {
    0      i == j ^ vs[[i]] == 1
    t - t* i == j ^ vs[[i]] == -1
    a      i < j
    -a*    i > j
};
```

```
In[*]:= Clear[a]; a = t - 1;
vs = {1, 1, -1, -1};
c1 = e1 - t e3 + (t - 1) e4;
c2 = e2 - e4;
{<c1, c1> <c1, c2>
 <c2, c1> <c2, c2>} // MatrixForm
```

```
Out[*]//MatrixForm=
{0 0
 0 0}
```

```
In[*]:= vs = {-1, -1, 1, 1};
c1 = e2 - t e4 + (t - 1) e1;
c2 = e3 - e1;
{<c1, c1> <c1, c2>
 <c2, c1> <c2, c2>} // MatrixForm
```

```
Out[*]//MatrixForm=
{0 0
 0 0}
```

```
In[*]:= vs = {1, 1, -1, -1};
c1 = e1 - e3;
c2 = e2 + (t-1 - 1) e3 - t-1 e4;
(⟨c1, c1⟩ ⟨c1, c2⟩)
(⟨c2, c1⟩ ⟨c2, c2⟩) // MatrixForm
```

```
Out[*]//MatrixForm=
```

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

```
In[*]:= vs = {1, -1, 1, -1};
c1 = e1 - e2;
c2 = e3 - e4;
(⟨c1, c1⟩ ⟨c1, c2⟩)
(⟨c2, c1⟩ ⟨c2, c2⟩) // MatrixForm
```

```
Out[*]//MatrixForm=
```

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

```
In[*]:= vs = {1, 1, -1, -1};
c1 = e1 - e4;
c2 = e2 - e3;
(⟨c1, c1⟩ ⟨c1, c2⟩)
(⟨c2, c1⟩ ⟨c2, c2⟩) // MatrixForm
```

```
Out[*]//MatrixForm=
```

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