In[1]:=
```
SetDirectory["/www/user/fdahl/papers/Conjugation/"];
<< kappaLib.m
<< Petrov.m
```

```
Petrov routine loaded

KappaLib v1.1

KappaLib v1.1

Petrov routine loaded
```

■ Class VII: (111111)

In[4]:=
$$B = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix};$$

In[5]:=
$$V = \begin{pmatrix} \text{lambda1} & 0 & 0 & 0 & 0 & 0 \\ 0 & \text{lambda2} & 0 & 0 & 0 & 0 \\ 0 & 0 & \text{lambda3} & 0 & 0 & 0 \\ 0 & 0 & 0 & \text{lambda4} & 0 & 0 \\ 0 & 0 & 0 & 0 & \text{lambda5} & 0 \\ 0 & 0 & 0 & 0 & 0 & \text{lambda6} \end{pmatrix};$$

In[6]:=
```
Eigenvalues[V]
```

Out[6]=
```
{lambda1, lambda2, lambda3, lambda4, lambda5, lambda6}
```

In[7]:=
$$W = \begin{pmatrix} \text{eps1} & 0 & 0 & 0 & 0 & 0 \\ 0 & \text{eps2} & 0 & 0 & 0 & 0 \\ 0 & 0 & \text{eps3} & 0 & 0 & 0 \\ 0 & 0 & 0 & \text{eps4} & 0 & 0 \\ 0 & 0 & 0 & 0 & \text{eps5} & 0 \\ 0 & 0 & 0 & 0 & 0 & \text{eps6} \end{pmatrix};$$

In[8]:=
```
Eigenvalues[W]
```

Out[8]=
```
{eps1, eps2, eps3, eps4, eps5, eps6}
```

In[9]:=
```
W = W /. {eps1 → -1, eps2 → -1, eps3 → -1, eps4 → 1, eps5 → 1, eps6 → 1};
W // MatrixForm
Eigenvalues[W]
```

Out[10]//MatrixForm=
$$\begin{pmatrix} -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Out[11]=
```
{-1, -1, -1, 1, 1, 1}
```

In[12]:=
```
S = Sqrt[2] {{-1/2, 0, 0, 1/2, 0, 0}, {0, -1/2, 0, 0, 1/2, 0}, {0, 0, -1/2, 0, 0, 1/2}, {1/2, 0, 0, 1/2, 0, 0}, {0, 1/2, 0, 0, 1/2, 0}, {0, 0, 1/2, 0, 0, 1/2}};
```

■ Check that S is in set mathcal(S)

In[13]:=
```
Transpose[S].B.S == W
```

Out[13]= True

■ Compute result

In[14]:=
```
res = S.V.Inverse[S];
res // MatrixForm
```

Out[15]//MatrixForm=

$$\begin{pmatrix} \frac{\text{lambda1}}{2}+\frac{\text{lambda4}}{2} & 0 & 0 & -\frac{\text{lambda1}}{2}+\frac{\text{lambda4}}{2} & 0 & 0 \\ 0 & \frac{\text{lambda2}}{2}+\frac{\text{lambda5}}{2} & 0 & 0 & -\frac{\text{lambda2}}{2}+\frac{\text{lambda5}}{2} & 0 \\ 0 & 0 & \frac{\text{lambda3}}{2}+\frac{\text{lambda6}}{2} & 0 & 0 & -\frac{\text{lambda3}}{2}+\frac{\text{lambda6}}{2} \\ -\frac{\text{lambda1}}{2}+\frac{\text{lambda4}}{2} & 0 & 0 & \frac{\text{lambda1}}{2}+\frac{\text{lambda4}}{2} & 0 & 0 \\ 0 & -\frac{\text{lambda2}}{2}+\frac{\text{lambda5}}{2} & 0 & 0 & \frac{\text{lambda2}}{2}+\frac{\text{lambda5}}{2} & 0 \\ 0 & 0 & -\frac{\text{lambda3}}{2}+\frac{\text{lambda6}}{2} & 0 & 0 & \frac{\text{lambda3}}{2}+\frac{\text{lambda6}}{2} \end{pmatrix}$$

In[16]:=
```
Petrov[res]
```

Out[16]//MatrixForm=

$$\begin{pmatrix} \frac{1}{2}(-\text{lambda1}+\text{lambda4}) & 0 & 0 & 0 \\ 0 & \frac{1}{2}(-\text{lambda2}+\text{lambda5}) & 0 & 0 \\ 0 & 0 & \frac{1}{2}(-\text{lambda3}+\text{lambda6}) & \frac{\text{lambda3}+\text{lambda6}}{2} \\ 0 & 0 & \frac{\text{lambda3}+\text{lambda6}}{2} & \frac{1}{2}(-\text{lambda3}+\text{lambda6}) \\ 0 & \frac{\text{lambda2}+\text{lambda5}}{2} & 0 & 0 \\ \frac{\text{lambda1}+\text{lambda4}}{2} & 0 & 0 & 0 \end{pmatrix} \quad \frac{1}{2}(-$$

■ Export notebook as .pdf

In[17]:=
```
NotebookPrint[SelectedNotebook[],
 "/www/user/fdahl/papers/Conjugation/notebooks/ClassVII.pdf"]
```