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In[*]:=  $\gamma = R_{1,2}$ 
Out[*]=

$$\{t_1, t_2, h_1, h_2\}$$


$$\begin{pmatrix} 1 & h_1 & h_2 \\ t_1 & 1 & 1 - T_1 \\ t_2 & 0 & T_1 \\ \Gamma & 1 & T_1 \end{pmatrix}$$


In[*]:=  $\gamma @ A$  // MatrixForm
Out[*]//MatrixForm=

$$\begin{pmatrix} 1 & 1 - T_1 \\ 0 & T_1 \end{pmatrix}$$


In[*]:= MapThread[Join, {IdentityMatrix@ $\gamma @ n$ ,  $\gamma @ A /. T \_ \rightarrow T$ }] // MatrixForm
Out[*]//MatrixForm=

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


In[*]:= MapThread[Join, {IdentityMatrix@ $\gamma @ n$ ,  $\gamma @ A /. T \_ \rightarrow T$ }] . Table[ $e_i$ , { $i$ , 2  $\gamma @ n$ }]
Out[*]=

$$\{e_1 + e_3 + (1 - T) e_4, e_2 + T e_4\}$$


In[*]:=  $vs = Table[t_i + \partial_{t_i} \gamma @ \lambda /. T \_ \rightarrow T, \{i, \gamma @ S\}]$ 
Out[*]=

$$\{h_1 + (1 - T) h_2 + t_1, T h_2 + t_2\}$$


In[*]:=  $T^* \wedge := T^{-1}$ ;
<  $c\_ , d\_ \rangle_{c\_} := Expand@Module[{ $e, f$ },
Expand[ $c (d /. \{T \rightarrow T^*, t_i \_ \rightarrow t_i^*, h_i \_ \rightarrow h_i^*\})$ ] /.
{ $t_i \_ * t_i \_ \rightarrow 0, h_i \_ * h_i \_ \rightarrow T - T^*, (f : t | h)_{j\_} * (e : t | h)_{i\_} \rightarrow$ 
If[Position[ $c, e_i$ ][[1, 1]] < Position[ $c, f_j$ ][[1, 1]],  $T - 1, 1 - T^*$ ]}
];
Table[<  $vs[[i]$ ,  $vs[[j]] \rangle_{\gamma @ c}$ , { $i, \gamma @ n$ }, { $j, \gamma @ n$ }] // MatrixForm
Out[*]//MatrixForm=

$$\begin{pmatrix} \frac{1}{T^2} - \frac{4}{T} + 4 T - T^2 & 5 - \frac{1}{T^2} - \frac{3}{T} - T \\ -5 + \frac{1}{T} + 3 T + T^2 & -\frac{2}{T} + 2 T \end{pmatrix}$$


In[*]:=  $\frac{(\text{Conjugate}[h_2] + T \text{Conjugate}[t_2]) (h_1 - (-1 + T) h_2 + t_1)}{T}$  // Expand
Out[*]=

$$\frac{\text{Conjugate}[h_2] h_1}{T} + \text{Conjugate}[t_2] h_1 - \text{Conjugate}[h_2] h_2 + \frac{\text{Conjugate}[h_2] h_2}{T} +$$


$$\text{Conjugate}[t_2] h_2 - T \text{Conjugate}[t_2] h_2 + \frac{\text{Conjugate}[h_2] t_1}{T} + \text{Conjugate}[t_2] t_1$$$ 
```