```mathematica
In[1]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\2012-01"];
       << betaCalculus.m
```

```mathematica
In[127]:= βSimplify = FullSimplify;
```

```mathematica
In[128]:= {
          α1 = W[1] + Sum[α10 i+j ar[i, j], {i, 3}, {j, 3}],
          (α1 // dm[1, 2, 1]) /. _c → c,
          (α1 // dm[1, 2, 1]) /. _c → c - 1,
          (α1 // dm[1, 2, 1]) /. _c → c + 1
         } // βCollect // βForm // ColumnForm
```

$$
\text{Out[128]=}
\begin{pmatrix}
W[1] & h[1] & h[2] & h[3] \\
t[1] & \alpha_{11} & \alpha_{12} & \alpha_{13} \\
t[2] & \alpha_{21} & \alpha_{22} & \alpha_{23} \\
t[3] & \alpha_{31} & \alpha_{32} & \alpha_{33}
\end{pmatrix}
$$

$$
\begin{pmatrix}
W\left[1 - \frac{c\,\alpha_{21}}{1+c\,(\alpha_{11}+\alpha_{21}+\alpha_{31})}\right] & h[1] & h[3] \\[2mm]
t[1] & \alpha_{22} + \frac{\alpha_{21}\,(1+c\,\alpha_{22})}{1+c\,(\alpha_{11}+\alpha_{31})} + \frac{(1+c\,(\alpha_{11}+\alpha_{21}+\alpha_{31}))\,(\alpha_{11}\,(1+c\,(\alpha_{12}+\alpha_{22}))+\alpha_{12}\,(1+c\,\alpha_{31}))}{1+c\,(\alpha_{11}+\alpha_{31})} & \alpha_{13} + \frac{(1+c\,\alpha_{11})\,\alpha_{23}}{1+c\,(\alpha_{11}+\alpha_{31})} \\[2mm]
t[3] & \frac{(1+c\,(\alpha_{11}+\alpha_{21}+\alpha_{31}))\,((1+c\,\alpha_{11})\,\alpha_{32}+\alpha_{31}\,(1+c\,(\alpha_{22}+\alpha_{32})))}{1+c\,(\alpha_{11}+\alpha_{31})} & \frac{c\,\alpha_{23}\,\alpha_{31}}{1+c\,(\alpha_{11}+\alpha_{31})} + \alpha_{33}
\end{pmatrix}
$$

$$
\begin{pmatrix}
W\left[1 - \frac{(-1+c)\,\alpha_{21}}{1+(-1+c)\,(\alpha_{11}+\alpha_{21})+(-1+c)\,\alpha_{31}}\right] & h[1] \\[2mm]
t[1] & \alpha_{22} + \frac{\alpha_{21}\,(1+(-1+c)\,\alpha_{22})}{1+(-1+c)\,\alpha_{11}+(-1+c)\,\alpha_{31}} + \frac{(1+(-1+c)\,(\alpha_{11}+\alpha_{21})+(-1+c)\,\alpha_{31})\,(\alpha_{11}\,(1+(-1+c)\,(\alpha_{12}+\alpha_{22})}{1+(-1+c)\,\alpha_{11}+(-1+c)\,\alpha_{31}} \\[2mm]
t[3] & \frac{(1+(-1+c)\,(\alpha_{11}+\alpha_{21})+(-1+c)\,\alpha_{31})\,((1+(-1+c)\,\alpha_{11})\,\alpha_{32}+\alpha_{31}\,(1+(-1+c)\,\alpha_{22}+(-1+c)}{1+(-1+c)\,\alpha_{11}+(-1+c)\,\alpha_{31}}
\end{pmatrix}
$$

$$
\begin{pmatrix}
W\left[1 - \frac{(1+c)\,\alpha_{21}}{1+(1+c)\,(\alpha_{11}+\alpha_{21})+(1+c)\,\alpha_{31}}\right] & h[1] \\[2mm]
t[1] & \alpha_{22} + \frac{\alpha_{21}\,(1+(1+c)\,\alpha_{22})}{1+(1+c)\,\alpha_{11}+(1+c)\,\alpha_{31}} + \frac{(1+(1+c)\,(\alpha_{11}+\alpha_{21})+(1+c)\,\alpha_{31})\,(\alpha_{11}\,(1+(1+c)\,(\alpha_{12}+\alpha_{22}))+\alpha_{12}\,(1}{1+(1+c)\,\alpha_{11}+(1+c)\,\alpha_{31}} \\[2mm]
t[3] & \frac{(1+(1+c)\,(\alpha_{11}+\alpha_{21})+(1+c)\,\alpha_{31})\,((1+(1+c)\,\alpha_{11})\,\alpha_{32}+\alpha_{31}\,(1+(1+c)\,\alpha_{22}+(1+c)\,\alpha_{32}))}{1+(1+c)\,\alpha_{11}+(1+c)\,\alpha_{31}}
\end{pmatrix}
$$

```mathematica
In[130]:= 1 - (-1 + c) α21 / (1 + (-1 + c) (α11 + α21) + (-1 + c) α31) // Simplify
```

$$
\text{Out[130]=} \quad 1 - \frac{(-1+c)\,\alpha_{21}}{1+(-1+c)\,(\alpha_{11}+\alpha_{21})+(-1+c)\,\alpha_{31}}
$$

```mathematica
In[135]:= 1 - c α21 / (1 + c (α11 + α21 + α31)) // Factor
```

$$
\text{Out[135]=} \quad \frac{1 + c\,\alpha_{11} + c\,\alpha_{31}}{1 + c\,\alpha_{11} + c\,\alpha_{21} + c\,\alpha_{31}}
$$