

Pensieve header: Twisting V by R 's - continued pensieve://2015-12/.

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2015-10"];
```

```
<< "../Projects/MetaCalculi/MetaCalculi.m"
```

MetaCalculi` loading...

```
Ti := ebi;
```

```
bConjugate[expr_] := expr /. bi -> -bi;
```

```
bSimplify[expr_] :=
```

```
Assuming[b1 > 0 & b2 > 0 & b3 > 0 & bi > 0 & bj > 0, FullSimplify[PowerExpand[expr]]];
```

```
RSimp = bSimplify;
```

```
R[a_, b_, p_] := Γ[1, ha + hb Tap, {ta, tb}. (1 1 - Tap / 0 Tap). {ha, hb}];
```

```
{R[1, 2, 1], R[1, 2, 1/2]**R[1, 2, 1/2]}
```

$$\left\{ \begin{pmatrix} 1 & s_1 & s_2 \\ s_1 & 1 & 1 - e^{b_1} \\ s_2 & 0 & e^{b_1} \\ \Gamma & 1 & e^{b_1} \end{pmatrix}, \begin{pmatrix} 1 & s_1 & s_2 \\ s_1 & 1 & 1 - e^{b_1} \\ s_2 & 0 & e^{b_1} \\ \Gamma & 1 & e^{b_1} \end{pmatrix} \right\}$$

```
Γ[V] // bSimplify
```

$$\begin{pmatrix} \frac{2^{1/4}}{\left(\frac{\text{Coth}\left[\frac{b_1}{2}\right] + \text{Coth}\left[\frac{b_2}{2}\right] b_1 b_2}{b_1 + b_2}\right)^{1/4}} & S_1 & S_2 \\ S_1 & \frac{\sqrt{(-1+e^{b_1})(-1+e^{b_2})(-1+e^{b_1+b_2})} b_1 + e^{\frac{b_1}{2}} (-1+e^{b_2}) \sqrt{b_1 b_2 (b_1+b_2)}}{\sqrt{(-1+e^{b_1})(-1+e^{b_2})(-1+e^{b_1+b_2})} (b_1+b_2)} & \frac{b_1 - e^{\frac{b_1+b_2}{2}} \sqrt{\frac{(-1+e^{b_1}) b_1 b_2 (b_1+b_2)}{(-1+e^{b_2})(-1+e^{b_1+b_2})}}}{b_1+b_2} \\ S_2 & \frac{\sqrt{(-1+e^{b_1})(-1+e^{b_2})(-1+e^{b_1+b_2})} b_2 - e^{\frac{b_1}{2}} (-1+e^{b_2}) \sqrt{b_1 b_2 (b_1+b_2)}}{\sqrt{(-1+e^{b_1})(-1+e^{b_2})(-1+e^{b_1+b_2})} (b_1+b_2)} & \frac{b_2 + e^{\frac{b_1+b_2}{2}} \sqrt{\frac{(-1+e^{b_1}) b_1 b_2 (b_1+b_2)}{(-1+e^{b_2})(-1+e^{b_1+b_2})}}}{b_1+b_2} \\ \Gamma & 1 & e^{\frac{b_1}{2}} \end{pmatrix}$$

```
R[1, 2, -1/2]**Γ[V] // bSimplify
```

$$\begin{pmatrix} \frac{2^{1/4}}{\left(\frac{\text{Coth}\left[\frac{b_1}{2}\right] + \text{Coth}\left[\frac{b_2}{2}\right] b_1 b_2}{b_1 + b_2}\right)^{1/4}} & S_1 & \\ S_1 & \frac{e^{\frac{b_1}{2}} (-1+e^{b_2}) \sqrt{b_1 b_2 (b_1+b_2)} + b_1 \sqrt{(-1+e^{b_1})(-1+e^{b_2})(-1+e^{b_1+b_2})} (b_1+b_2)}{\sqrt{(-1+e^{b_1})(-1+e^{b_2})(-1+e^{b_1+b_2})} (b_1+b_2)^{3/2}} & -\frac{(-1+e^{\frac{b_1}{2}}) \left(1+e^{\frac{b_1+b_2}{2}}\right) \sqrt{b_1 b_2}}{\sqrt{(-1+e^b}} \\ S_2 & \frac{-e^{\frac{b_1}{2}} (-1+e^{b_2}) \sqrt{b_1 b_2 (b_1+b_2)} + b_2 \sqrt{(-1+e^{b_1})(-1+e^{b_2})(-1+e^{b_1+b_2})} (b_1+b_2)}{\sqrt{(-1+e^{b_1})(-1+e^{b_2})(-1+e^{b_1+b_2})} (b_1+b_2)^{3/2}} & \frac{(-1+e^{\frac{b_1}{2}}) \left(1+e^{\frac{b_1+b_2}{2}}\right) \sqrt{b_1 b_2}}{\sqrt{(-1+e^b}} \\ \Gamma & 1 & \end{pmatrix}$$

$\Gamma[V] ** R[1, 2, -1/2]$ // bSimplify

$$\left(\begin{array}{l} \frac{2^{1/4}}{\left(\frac{\text{Coth}\left[\frac{b_1}{2}\right] + \text{Coth}\left[\frac{b_2}{2}\right]}{b_1 + b_2} \right) b_1 b_2} \right)^{1/4} \\ S_1 \\ S_1 \\ S_2 \\ \Gamma \end{array} \right) \begin{array}{l} S_1 \\ e^{-\frac{b_1}{2}} \left(e^{\frac{b_1}{2}} (-1 + e^{b_2}) \sqrt{b_1 b_2} (b_1 + b_2) + \sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)} (-b_2 + e^{\frac{b_1}{2}} (b_1 + b_2)) \right) e^{-\frac{b_1}{2}} (- \\ \sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)^{3/2}} \\ e^{-\frac{b_1}{2}} \left(-e^{\frac{b_1}{2}} (-1 + e^{b_2}) \sqrt{b_1} (b_1 + b_2) + \sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) b_2 (b_1 + b_2)} \right) \\ \sqrt{\frac{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)^3}{b_2}} \\ 1 \end{array}$$

$R[1, 2, 1/2] ** \Gamma[V]$ // bSimplify

$$\left(\begin{array}{l} \frac{2^{1/4}}{\left(\frac{\text{Coth}\left[\frac{b_1}{2}\right] + \text{Coth}\left[\frac{b_2}{2}\right]}{b_1 + b_2} \right) b_1 b_2} \right)^{1/4} \\ S_1 \\ S_1 \\ S_2 \\ \Gamma \end{array} \right) \begin{array}{l} S_1 \\ \frac{e^{\frac{b_1}{2}} (-1 + e^{b_2}) \sqrt{b_1 b_2} (b_1 + b_2) + b_1 \sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)}}{\sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)^{3/2}}} - \left(-e^{\frac{b_1}{2}} + e^{b_1} \right) \left(-1 + e^{b_2} \left(1 + e^{\frac{b_1}{2}} + \sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)} \right) \right) \\ \frac{-e^{\frac{b_1}{2}} (-1 + e^{b_2}) \sqrt{b_1 b_2} (b_1 + b_2) + b_2 \sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)}}{\sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)^{3/2}}} - \left(-e^{\frac{b_1}{2}} + e^{b_1} \right) \left(-1 + e^{b_2} \left(1 + e^{\frac{b_1}{2}} + \sqrt{(-1 + e^{b_1}) (-1 + e^{b_2}) (-1 + e^{b_1 + b_2}) (b_1 + b_2)} \right) \right) \\ 1 \end{array}$$