```
s1 = a[b3/b2 - e^(t b2) b3/b2, 2, 4] // Ad[a[s, 2, 3]] // LSimp
```

$$\left\{\beta\left[\frac{b_3}{b_2}-\frac{e^{t b_2} b_3}{b_2}\right]+\gamma\left[\frac{\left(-1+e^{-s b_2}\right)\left(\frac{1}{b_2}-\frac{e^{t b_2}}{b_2}+\frac{b_3}{b_2^2}-\frac{e^{t b_2} b_3}{b_2^2}+\frac{e^{t b_2} t b_3}{b_2}\right)}{b_2}, 2, 3\right], \frac{b_3}{b_2}-\frac{e^{t b_2} b_3}{b_2}, \text{Null}\right\}$$

$$\left\{\gamma\left[\frac{\left(-1+e^{-s b_2}\right)\left(\frac{1}{b_2}-\frac{e^{t b_2}}{b_2}+\frac{b_3}{b_2^2}-\frac{e^{t b_2} b_3}{b_2^2}+\frac{e^{t b_2} t b_3}{b_2}\right)}{b_2}, 2, 3\right]\right\}$$

$$a\left[\frac{b_3}{b_2}-\frac{e^{t b_2} b_3}{b_2}, 2, 4\right]+\gamma\left[\frac{s b_3}{b_2}-\frac{e^{t b_2} s b_3}{b_2}, 2, 3, 4\right]+$$
$$\gamma a\left[-\frac{1}{b_2^2}+\frac{e^{-s b_2}}{b_2^2}+\frac{e^{t b_2}}{b_2^2}-\frac{e^{-s b_2+t b_2}}{b_2^2}-\frac{s b_3}{b_2^2}+\frac{e^{t b_2} s b_3}{b_2^2}-\frac{e^{t b_2} t b_3}{b_2^2}+\frac{e^{-s b_2+t b_2} t b_3}{b_2^2}, 2, 3, 2, 4\right]$$

```
s2 = a[(1 - e^(t b2)) b3/b2, 2, 4] // Ad[a[s, 2, 3]] // LSimp
```

$$\left\{\beta\left[\frac{\left(1-e^{t b_2}\right) b_3}{b_2}\right]+\gamma\left[\frac{\left(-1+e^{-s b_2}\right)\left(\frac{1-e^{t b_2}}{b_2}+\frac{\left(1-e^{t b_2}\right) b_3}{b_2^2}+\frac{e^{t b_2} t b_3}{b_2}\right)}{b_2}, 2, 3\right], \frac{\left(1-e^{t b_2}\right) b_3}{b_2}, \text{Null}\right\}$$

$$\left\{\gamma\left[\frac{\left(-1+e^{-s b_2}\right)\left(\frac{1-e^{t b_2}}{b_2}+\frac{\left(1-e^{t b_2}\right) b_3}{b_2^2}+\frac{e^{t b_2} t b_3}{b_2}\right)}{b_2}, 2, 3\right]\right\}$$

$$a\left[\frac{b_3}{b_2}-\frac{e^{t b_2} b_3}{b_2}, 2, 4\right]+\gamma\left[\frac{s b_3}{b_2}-\frac{e^{t b_2} s b_3}{b_2}, 2, 3, 4\right]+$$
$$\gamma a\left[-\frac{1}{b_2^2}+\frac{e^{-s b_2}}{b_2^2}+\frac{e^{t b_2}}{b_2^2}-\frac{e^{-s b_2+t b_2}}{b_2^2}-\frac{s b_3}{b_2^2}+\frac{e^{t b_2} s b_3}{b_2^2}-\frac{e^{t b_2} t b_3}{b_2^2}+\frac{e^{-s b_2+t b_2} t b_3}{b_2^2}, 2, 3, 2, 4\right]$$

```
s1 - s2 // LSimp
```

0

```
Simplify[(-1 + e^(-s b2)) ((1-e^(t b2))/b2 + ((1-e^(t b2)) b3)/b2^2 + (e^(t b2) t b3)/b2)/b2]
```

$$-\frac{e^{-s b_2}\left(-1+e^{s b_2}\right)\left(-\left(-1+e^{t b_2}\right) b_3+b_2\left(1-e^{t b_2}+e^{t b_2} t b_3\right)\right)}{b_2^3}$$

```
t0 = a[g, 3, 4]
```

a[g, 3, 4]

```
{t, s}
```

{t, s}

```
t0 // Ad[a[t, 2, 3]]
```

$$a\left[e^{t\,b_2}\,g,\,3,\,4\right]+a\left[\frac{g\,b_3}{b_2}-\frac{e^{t\,b_2}\,g\,b_3}{b_2},\,2,\,4\right]+\gamma\left[\frac{g}{b_2}-\frac{e^{t\,b_2}\,g}{b_2}+\frac{g\,b_3}{b_2^2}-\frac{e^{t\,b_2}\,g\,b_3}{b_2^2}+\frac{g\,t\,b_3}{b_2},\,2,\,3,\,4\right]+\gamma a\left[\frac{g}{b_2^2}-\frac{e^{t\,b_2}\,g}{b_2^2}+\frac{e^{t\,b_2}\,g\,t}{b_2},\,2,\,3,\,3,\,4\right]+\gamma a\left[-\frac{2\,g}{b_2^2}+\frac{e^{-t\,b_2}\,g}{b_2^2}+\frac{e^{t\,b_2}\,g}{b_2^2}-\frac{2\,g\,b_3}{b_2^3}+\frac{2\,e^{t\,b_2}\,g\,b_3}{b_2^3}-\frac{g\,t\,b_3}{b_2^2}-\frac{e^{t\,b_2}\,g\,t\,b_3}{b_2^2},\,2,\,3,\,2,\,4\right]$$

```
((t0 // Ad[a[t, 2, 3]]) /. g → 1) - ((t0 /. g → 1) // Ad[a[t, 2, 3]])
```

0

```
(tt = {((t0 // Ad[a[t, 2, 3]]) /. g → 1), ((t0 /. g → 1) // Ad[a[t, 2, 3]])}) //
 ColumnForm
```

$$a\left[e^{t\,b_2},\,3,\,4\right]+a\left[\frac{b_3}{b_2}-\frac{e^{t\,b_2}\,b_3}{b_2},\,2,\,4\right]+\gamma\left[\frac{1}{b_2}-\frac{e^{t\,b_2}}{b_2}+\frac{b_3}{b_2^2}-\frac{e^{t\,b_2}\,b_3}{b_2^2}+\frac{t\,b_3}{b_2},\,2,\,3,\,4\right]+\gamma a\left[\frac{1}{b_2^2}-\frac{e^{t\,b_2}}{b_2^2}+\frac{e^{t\,b_2}\,t}{b_2},\,2,\right.$$

$$\left.a\left[e^{t\,b_2},\,3,\,4\right]+a\left[\frac{(1-e^{t\,b_2})\,b_3}{b_2},\,2,\,4\right]+\gamma\left[\frac{t\,b_2\,b_3+(1-e^{t\,b_2})\,(b_2+b_3)}{b_2^2},\,2,\,3,\,4\right]+\gamma a\left[\frac{1+e^{t\,b_2}\,(-1+t\,b_2)}{b_2^2},\,2,\,3,\,4\right]\right.$$

```
{1, -1}.tt
```

0

```
tt[[All, 2]]
```

$$\left\{a\left[\frac{b_3}{b_2}-\frac{e^{t\,b_2}\,b_3}{b_2},\,2,\,4\right],\,a\left[\frac{\left(1-e^{t\,b_2}\right)\,b_3}{b_2},\,2,\,4\right]\right\}$$

```
(ss = (#[[2]] // Ad[a[s, 2, 3]] // LSimp) & /@ tt) // ColumnForm
```

$$a\left[\frac{b_3}{b_2}-\frac{e^{t\,b_2}\,b_3}{b_2},\,2,\,4\right]+\gamma\left[\frac{s\,b_3}{b_2}-\frac{e^{t\,b_2}\,s\,b_3}{b_2},\,2,\,3,\,4\right]+\gamma a\left[-\frac{1}{b_2^2}+\frac{e^{-s\,b_2}}{b_2^2}+\frac{e^{t\,b_2}}{b_2^2}-\frac{e^{-s\,b_2+t\,b_2}}{b_2^2}-\frac{s\,b_3}{b_2^2}+\frac{e^{t\,b_2}\,s\,b_3}{b_2^2}-\frac{e^{t\,b_2}\,t\,b_3}{b_2^2}\right.$$

$$\left.a\left[\frac{b_3}{b_2}-\frac{e^{t\,b_2}\,b_3}{b_2},\,2,\,4\right]+\gamma\left[\frac{s\,b_3}{b_2}-\frac{e^{t\,b_2}\,s\,b_3}{b_2},\,2,\,3,\,4\right]+\gamma a\left[\frac{b_3}{b_2^3}-\frac{e^{-s\,b_2}\,b_3}{b_2^3}-\frac{e^{t\,b_2}\,b_3}{b_2^3}+\frac{e^{-s\,b_2+t\,b_2}\,b_3}{b_2^3}-\frac{s\,b_3}{b_2^2}+\frac{e^{t\,b_2}\,s\,b_3}{b_2^2},\,2,\right.\right.$$

```
{1, -1}.ss
```

$$\gamma a\left[-\frac{1}{b_2^2}+\frac{e^{-s\,b_2}}{b_2^2}+\frac{e^{t\,b_2}}{b_2^2}-\frac{e^{-s\,b_2+t\,b_2}}{b_2^2}-\frac{b_3}{b_2^3}+\frac{e^{-s\,b_2}\,b_3}{b_2^3}+\frac{e^{t\,b_2}\,b_3}{b_2^3}-\frac{e^{-s\,b_2+t\,b_2}\,b_3}{b_2^3}-\frac{e^{t\,b_2}\,t\,b_3}{b_2^2}+\frac{e^{-s\,b_2+t\,b_2}\,t\,b_3}{b_2^2},\,2,\,3,\,2,\,4\right]$$

```
t1 = (t0 /. g → 1) // Ad[a[t, 2, 3]] // Ad[a[s, 2, 3]] // LSimp
```

$$a\left[e^{s\,b_2+t\,b_2},\,3,\,4\right]+a\left[\frac{b_3}{b_2}-\frac{e^{s\,b_2+t\,b_2}\,b_3}{b_2},\,2,\,4\right]+$$
$$\gamma\left[\frac{1}{b_2}-\frac{e^{s\,b_2+t\,b_2}}{b_2}+\frac{b_3}{b_2^2}-\frac{e^{s\,b_2+t\,b_2}\,b_3}{b_2^2}+\frac{s\,b_3}{b_2}+\frac{t\,b_3}{b_2},\,2,\,3,\,4\right]+$$
$$\gamma a\left[\frac{1}{b_2^2}-\frac{e^{s\,b_2+t\,b_2}}{b_2^2}+\frac{e^{s\,b_2+t\,b_2}\,s}{b_2}+\frac{e^{s\,b_2+t\,b_2}\,t}{b_2},\,2,\,3,\,3,\,4\right]+$$
$$\gamma a\left[-\frac{1}{b_2^2}-\frac{e^{-s\,b_2}}{b_2^2}-\frac{e^{t\,b_2}}{b_2^2}+\frac{e^{-s\,b_2-t\,b_2}}{b_2^2}+\frac{e^{-s\,b_2+t\,b_2}}{b_2^2}+\frac{e^{s\,b_2+t\,b_2}}{b_2^2}-\frac{b_3}{b_2^3}-\right.$$
$$\frac{e^{-s\,b_2}\,b_3}{b_2^3}-\frac{e^{t\,b_2}\,b_3}{b_2^3}+\frac{e^{-s\,b_2+t\,b_2}\,b_3}{b_2^3}+\frac{2\,e^{s\,b_2+t\,b_2}\,b_3}{b_2^3}-\frac{s\,b_3}{b_2^2}-\frac{e^{s\,b_2+t\,b_2}\,s\,b_3}{b_2^2}-$$
$$\left.\frac{t\,b_3}{b_2^2}+\frac{e^{t\,b_2}\,t\,b_3}{b_2^2}-\frac{e^{-s\,b_2+t\,b_2}\,t\,b_3}{b_2^2}-\frac{e^{s\,b_2+t\,b_2}\,t\,b_3}{b_2^2},\,2,\,3,\,2,\,4\right]$$

```
t2 = ((t0 // Ad[a[t, 2, 3]]) /. g → 1) // Ad[a[s, 2, 3]] // LSimp
```

$$a\left[e^{s\,b_2+t\,b_2},\,3,\,4\right]+a\left[\frac{b_3}{b_2}-\frac{e^{s\,b_2+t\,b_2}\,b_3}{b_2},\,2,\,4\right]+$$
$$\gamma\left[\frac{1}{b_2}-\frac{e^{s\,b_2+t\,b_2}}{b_2}+\frac{b_3}{b_2^2}-\frac{e^{s\,b_2+t\,b_2}\,b_3}{b_2^2}+\frac{s\,b_3}{b_2}+\frac{t\,b_3}{b_2},\,2,\,3,\,4\right]+$$
$$\gamma a\left[\frac{1}{b_2^2}-\frac{e^{s\,b_2+t\,b_2}}{b_2^2}+\frac{e^{s\,b_2+t\,b_2}\,s}{b_2}+\frac{e^{s\,b_2+t\,b_2}\,t}{b_2},\,2,\,3,\,3,\,4\right]+\gamma a\left[-\frac{2}{b_2^2}+\frac{e^{-s\,b_2-t\,b_2}}{b_2^2}+\frac{e^{s\,b_2+t\,b_2}}{b_2^2}-\right.$$
$$\left.\frac{2\,b_3}{b_2^3}+\frac{2\,e^{s\,b_2+t\,b_2}\,b_3}{b_2^3}-\frac{s\,b_3}{b_2^2}-\frac{e^{s\,b_2+t\,b_2}\,s\,b_3}{b_2^2}-\frac{t\,b_3}{b_2^2}-\frac{e^{s\,b_2+t\,b_2}\,t\,b_3}{b_2^2},\,2,\,3,\,2,\,4\right]$$

```
LSimp[t1 - t2]
```

$$\gamma a\left[\frac{1}{b_2^2}-\frac{e^{-s\,b_2}}{b_2^2}-\frac{e^{t\,b_2}}{b_2^2}+\frac{e^{-s\,b_2+t\,b_2}}{b_2^2}+\frac{b_3}{b_2^3}-\frac{e^{-s\,b_2}\,b_3}{b_2^3}-\right.$$
$$\left.\frac{e^{t\,b_2}\,b_3}{b_2^3}+\frac{e^{-s\,b_2+t\,b_2}\,b_3}{b_2^3}+\frac{e^{t\,b_2}\,t\,b_3}{b_2^2}-\frac{e^{-s\,b_2+t\,b_2}\,t\,b_3}{b_2^2},\,2,\,3,\,2,\,4\right]$$

```
Expand[((# // Ad[a[s, 2, 3]]) /. g → 1) == ((# /. g → 1) // Ad[a[s, 2, 3]])] & /@
  (List @@ (a[g, 3, 4] // Ad[a[t, 2, 3]]))
```

```
{True, True, True, True, True}
```