Pensieve header: Caps and cups for NOE-0.

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\OneCo-1606"];
<< NOE-0.m
```

```
Rp[1, 2] // m[1, 2, 1]
```

$$\mathbb{E}\left[b_1 c_1 + \frac{e^{-b_1}\left(-1+e^{b_1}\right) u_1 w_1}{b_1}\right]$$

```
Rp[1, 2] // m[2, 1, 1]
```

$$e^{-b_1}\,\mathbb{E}\left[b_1 c_1 + \frac{e^{-b_1}\left(-1+e^{b_1}\right) u_1 w_1}{b_1}\right]$$

```
Rp[1, 2] Rp[4, 3] // m[1, 2, 1] // m[1, 3, 1] // m[1, 4, 1]
```

$$e^{-b_1}\,\mathbb{E}\left[\frac{2 b_1^2 c_1 + \left(1-e^{-2 b_1}\right) u_1 w_1}{b_1}\right]$$

```
Fo4[i_] := e^(-b_i/4) 𝔼[(b_i^2 c_i / 2 + (1 - e^(-b_i/2)) u_i w_i) / b_i]
```

```
Fo4[1] Fo4[2] Fo4[3] Fo4[4] // m[1, 2, 1] // m[1, 3, 1] // m[1, 4, 1]
```

$$e^{-b_1}\,\mathbb{E}\left[\frac{2 b_1^2 c_1 + \left(1-e^{-2 b_1}\right) u_1 w_1}{b_1}\right]$$

```
iFo4[i_] := e^(b_i/4) 𝔼[(b_i^2 c_i / 2 - (1 - e^(b_i/2)) u_i w_i) / (-b_i)]
```

```
Fo4[1] iFo4[2] // m[1, 2, 1]
```

$$\mathbb{E}[0]$$

```
Rp[1, 2] iFo4[3] iFo4[4] // m[1, 3, 1] // m[2, 4, 2]
```

$$e^{\frac{1}{4}(b_1+b_2)}\,\mathbb{E}\left[-\frac{1}{2 b_1 b_2}\left(b_1^2 b_2 (c_1 - 2 c_2) - 2\left(-1+e^{\frac{b_1}{2}}\right) b_2 u_1 \left(-w_1 + \left(e^{\frac{b_1}{2}} + e^{b_1}\right) w_2\right) + b_1\left(b_2^2 c_2 + 2\left(-1+e^{\frac{b_2}{2}}\right) u_2 w_2\right)\right)\right]$$

```
Rp[1, 2] iFo4[3] iFo4[4] // m[1, 3, 1] // m[1, 4, 1]
```

$$e^{\frac{b_1}{2}}\,\mathbb{E}\left[\frac{b_1^2 (-c_1 + c_2) + \left(-1+e^{b_1}\right) u_1 \left(-w_1 + e^{b_1} w_2\right)}{b_1}\right]$$

```
Rp[1, 2] iFo4[3] iFo4[4] // m[1, 3, 1] // m[1, 4, 1] // m[1, 2, 1]
```

$$e^{\frac{b_1}{2}}\,\mathbb{E}[0]$$

```
Rp[1, 2] iFo4[3] iFo4[4] // m[1, 3, 1] // m[1, 4, 1] // m[2, 1, 1]
```

$$e^{-\frac{b_1}{2}}\,\mathbb{E}[0]$$

```
Rp[1, 2] iFo4[3] iFo4[4] // m[2, 3, 2] // m[2, 4, 2]
```

$$e^{\frac{b_2}{2}}\,\mathbb{E}\left[\frac{b_1^2\,b_2\,c_2+\left(-1+e^{b_1}\right)\,b_2\,u_1\,w_2-b_1\,\left(b_2^2\,c_2+\left(-1+e^{b_2}\right)\,u_2\,w_2\right)}{b_1\,b_2}\right]$$

```
Rp[i, j] iFo4[1] iFo4[2] // m[i, 1, i] // m[j, 2, j]
```

$$e^{\frac{1}{4}\,(b_i+b_j)}\,\mathbb{E}\Big[-\frac{1}{2\,b_i\,b_j}\left(b_i^2\,b_j\,(c_i-2\,c_j)-2\,\left(-1+e^{\frac{b_i}{2}}\right)\,b_j\,u_i\,\left(-w_i+\left(e^{\frac{b_i}{2}}+e^{b_i}\right)\,w_j\right)+b_i\,\left(b_j^2\,c_j+2\,\left(-1+e^{\frac{b_j}{2}}\right)\,u_j\,w_j\right)\right)\Big]$$

```
Simp[(Rp[1, 2] iFo4[3] iFo4[4] // m[1, 3, 1] // m[1, 4, 1]) /. u_i_ → (-u_i b_i)/(e^b_i - 1)]
```

$$e^{\frac{b_1}{2}}\,\mathbb{E}\left[b_1\,(-c_1+c_2)+u_1\,\left(w_1-e^{b_1}\,w_2\right)\right]$$

```
ur[i_] := e^(b_i/4) E[0]; nr[i_] := e^(-b_i/4) E[0];
ul[i_] := e^(-b_i/4) E[0]; nl[i_] := e^(b_i/4) E[0];
```

```
ur[1] nr[2] // m[1, 2, 1]
```

$$\mathbb{E}[0]$$

```
ul[1] nl[2] // m[1, 2, 1]
```

$$\mathbb{E}[0]$$

```
(* kpr for "kink positive right", etc. *)
kpr = Rp[1, 4] nr[3] ul[4] // m[1, 2, 1] // m[1, 3, 1] // m[1, 4, 1]
```

$$e^{-\frac{b_1}{2}}\,\mathbb{E}\left[b_1\,c_1+\frac{e^{-b_1}\,\left(-1+e^{b_1}\right)\,u_1\,w_1}{b_1}\right]$$

```
kpl = Rp[4, 1] nl[3] ur[4] // m[1, 2, 1] // m[1, 3, 1] // m[1, 4, 1]
```

$$e^{-\frac{b_1}{2}}\,\mathbb{E}\left[b_1\,c_1+\frac{e^{-b_1}\,\left(-1+e^{b_1}\right)\,u_1\,w_1}{b_1}\right]$$

```
kmr = Rm[4, 1] nr[3] ul[4] // m[1, 2, 1] // m[1, 3, 1] // m[1, 4, 1]
```

$$e^{\frac{b_1}{2}}\,\mathbb{E}\left[-\frac{b_1^2\,c_1+\left(-1+e^{b_1}\right)\,u_1\,w_1}{b_1}\right]$$

```
kml = Rm[1, 4] nl[3] ur[4] // m[1, 2, 1] // m[1, 3, 1] // m[1, 4, 1]
```

$$e^{\frac{b_1}{2}}\,\mathbb{E}\left[-\frac{b_1^2\,c_1+\left(-1+e^{b_1}\right)\,u_1\,w_1}{b_1}\right]$$

```
kpr (kml // σ[1, 2]) // m[1, 2, 1]
```

$$\mathbb{E}[0]$$

```
kpr (kmr // σ[1, 2]) // m[1, 2, 1]
```

$$\mathbb{E}[0]$$