$$\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{}{u = wv + r \vdash s \mid u \,\&\, s \mid v \to s \mid r} \quad \dfrac{}{u = wv + r \vdash s \mid v \,\&\, s \mid r \to s \mid u}}{u = wv + r \vdash (s \mid u \,\&\, s \mid v \to s \mid r) \,\&\, (s \mid v \,\&\, s \mid r \to s \mid u)}\,(\vdash \&)}{u = wv + r \vdash \forall z((z \mid u \,\&\, z \mid v \to z \mid r) \,\&\, (z \mid v \,\&\, z \mid r \to z \mid u))}\,(\vdash \forall)\,(**)}{\vdash u = wv + r \to \forall z((z \mid u \,\&\, z \mid v \to z \mid r) \,\&\, (z \mid v \,\&\, z \mid r \to z \mid u))}\,(\vdash\to)}{\vdash \forall x \forall y \forall p \forall q(x = py + q \to \forall z((z \mid x \,\&\, z \mid y \to z \mid q) \,\&\, (z \mid y \,\&\, z \mid q \to z \mid x)))}\,(\vdash \forall)\,(*)$$

$$\dfrac{\dfrac{(5)}{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash (s \mid u)\ (t_4 \mid t_2)} \qquad \dfrac{(6)}{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash (s \mid u)\ (t_4 \mid t_3)}}{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash (s \mid u)\ (t_4 \mid t_2 \,\&\, t_4 \mid t_3)}\ (\vdash \&)$$

$$\dfrac{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash (s \mid u)\ (t_4 \mid t_2 \,\&\, t_4 \mid t_3) \qquad \dfrac{(7)}{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash (s \mid u)\ (t_2 = t_3 + t_1)}}{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash (s \mid u)\ (t_4 \mid t_2 \,\&\, t_4 \mid t_3 \,\&\, t_2 = t_3 + t_1)}\ (\vdash \&)$$

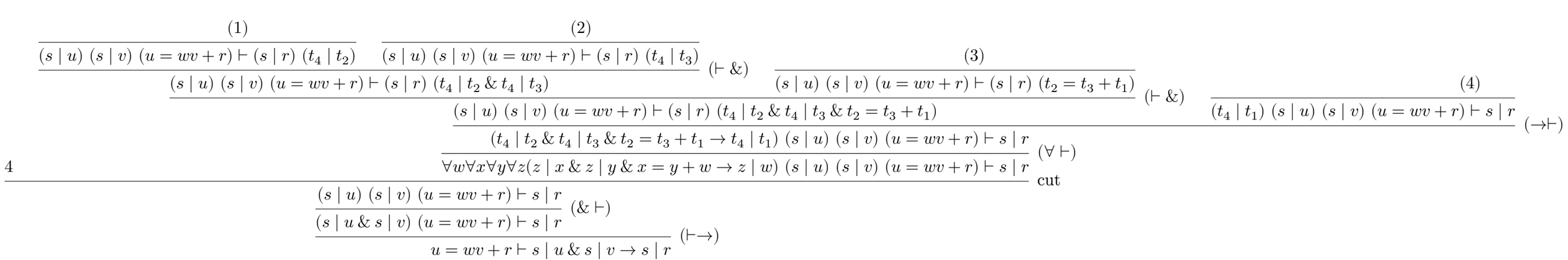
$$\dfrac{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash (s \mid u)\ (t_4 \mid t_2 \,\&\, t_4 \mid t_3 \,\&\, t_2 = t_3 + t_1) \qquad \dfrac{(8)}{(t_4 \mid t_1)\ (s \mid v)\ (s \mid r)\ (u = wv + r) \vdash s \mid u}}{(t_4 \mid t_2 \,\&\, t_4 \mid t_3 \,\&\, t_2 = t_3 + t_1 \to t_4 \mid t_1)\ (s \mid v)\ (s \mid r)\ (u = wv + r) \vdash s \mid u}\ (\to\vdash)$$

$$\dfrac{(t_4 \mid t_2 \,\&\, t_4 \mid t_3 \,\&\, t_2 = t_3 + t_1 \to t_4 \mid t_1)\ (s \mid v)\ (s \mid r)\ (u = wv + r) \vdash s \mid u}{\forall w \forall x \forall y \forall z (z \mid x \,\&\, z \mid y \,\&\, x = y + w \to z \mid w)\ (s \mid v)\ (s \mid r)\ (u = wv + r) \vdash s \mid u}\ (\forall \vdash)$$

$$\dfrac{4 \qquad \forall w \forall x \forall y \forall z (z \mid x \,\&\, z \mid y \,\&\, x = y + w \to z \mid w)\ (s \mid v)\ (s \mid r)\ (u = wv + r) \vdash s \mid u}{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash s \mid u}\ \text{cut}$$

$$\dfrac{(s \mid v)\ (s \mid r)\ (u = wv + r) \vdash s \mid u}{(s \mid v \,\&\, s \mid r)\ (u = wv + r) \vdash s \mid u}\ (\& \vdash)$$

$$\dfrac{(s \mid v \,\&\, s \mid r)\ (u = wv + r) \vdash s \mid u}{u = wv + r \vdash s \mid v \,\&\, s \mid r \to s \mid u}\ (\vdash\to)$$


(1)
(s | u) (s | v) (u = wv + r) ⊢ (s | r) (t4 | t2)
(2)
(s | u) (s | v) (u = wv + r) ⊢ (s | r) (t4 | t3)
(⊢ &)
(s | u) (s | v) (u = wv + r) ⊢ (s | r) (t4 | t2 & t4 | t3)
(3)
(s | u) (s | v) (u = wv + r) ⊢ (s | r) (t2 = t3 + t1)
(⊢ &)
(s | u) (s | v) (u = wv + r) ⊢ (s | r) (t4 | t2 & t4 | t3 & t2 = t3 + t1)
(4)
(t4 | t1) (s | u) (s | v) (u = wv + r) ⊢ s | r
(→⊢)
(t4 | t2 & t4 | t3 & t2 = t3 + t1 → t4 | t1) (s | u) (s | v) (u = wv + r) ⊢ s | r
(∀ ⊢)
4
∀w∀x∀y∀z(z | x & z | y & x = y + w → z | w) (s | u) (s | v) (u = wv + r) ⊢ s | r
cut
(s | u) (s | v) (u = wv + r) ⊢ s | r
(& ⊢)
(s | u & s | v) (u = wv + r) ⊢ s | r
(⊢→)
u = wv + r ⊢ s | u & s | v → s | r