

$$\textcircled{1} \quad (y = o) \wedge (y = x) \vdash o = x$$

$$\textcircled{1} \quad (y = o) \wedge (y = x) \quad \text{premise}$$

$$\textcircled{2} \quad y = o \quad \wedge e_1, 1$$

$$\textcircled{3} \quad y = x \quad \wedge e_2, 1$$

$$\textcircled{4} \quad o = x \quad = e 2, 3$$

$$\textcircled{3} \quad (\forall x P(x)) \rightarrow (\forall x Q(x)) \vdash \forall x ((\forall x P(x)) \rightarrow Q(x))$$

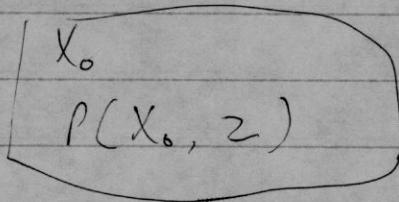
$$1. \quad (\forall x P(x)) \rightarrow (\forall x Q(x)) \quad \text{premise}$$

2.	$x_0$	
3.	$\forall x P(x)$	assumption
4.	$\forall x Q(x)$	$\rightarrow e 1, 3$
5.	$Q(x_0)$	$\forall x e 4$
6.	$\forall x P(x) \rightarrow Q(x_0)$	$\rightarrow i 3-5$

$$> \quad \forall x (\forall x P(x) \rightarrow Q(x)) \quad \forall x : 2-6$$

Scratch  
work

$$4. \forall x P(x, z) + \forall y P(y, z)$$



(4)

$$\forall_y P(y, z) \quad \forall y; 2-3$$

1.

$$\forall x P(x, z)$$

Ex. Premise

2.

$$x_0$$

3.

$$P(x_0, z)$$

$\forall x e 1$

4.

$$\forall y P(y, z)$$

$\forall y; 2-3$

(2)

$$t_1 = t_2 + (t_0 + t_2) = (t_0 + t_1)$$

1.  $t_1 = t_1$  Prem
  2.  $t + t_1 = t + t_1 \equiv i$
  3.  $t + t_2 = t + t_1 \quad = e 1, 2$
- $\underbrace{\qquad\qquad\qquad}_{}$

Rewritten only one occurrence of  $t_1$  w/  $t_2$ . Not sure if this is allowed.

1.  ~~$t_1 = t_2$~~
2.  ~~$\neg(t_0 + t_1) =$~~

1.  $t_1 = t_0$
2.  $\neg[t + t_0 = t + t_1] \quad \text{assume}$
3.  $\neg[t + t_1 = t + t_1] \quad = e 1, 2$
4.  $\perp$



Pretty obvious contradiction, not sure if its expressed syntactically correctly though