$\forall x\, \varphi(x) \models \exists x\, \varphi(x)$

1. $\forall x\, \varphi(x)$

$\exists x\, \varphi(x)$

$\forall x (P_x \to Q_x),\ \exists x P_x \models \exists_z Q_z$

1.	$\forall x (P_x \to Q_x)$		(given)
2.	$\exists x P_x$		(given)
3		P_c	(c, exist. constant (2))
4.		$P_c \to Q_c$	$E_\forall (1)$
5.		Q_c	$E_\to (3,4)$
6.		$\exists_z Q_z$	$I_\exists (5)$
7	$\exists_z Q_z$		$E_\exists (2,3,6)$

$$\forall x\, Px,\ \forall x\, Qx \vDash \forall x\,(Px \wedge Qx)$$

1. $\forall x\, Px$ (given)
2. $\forall x\, Qx$ (given)
3. c, generic constant
4. Pc $\quad E_{\forall}(1)$
5 Qc $\quad E_{\forall}(2)$

6 $Pc \wedge Qc$ $\quad I_{\wedge}(4,5)$

7 $\forall x\,(Px \wedge Qx)$ $\quad I_{\forall}(3,6)$

$$\exists y \forall x Rxy \models \forall x \exists y Rxy$$

1. $\exists y \forall x Rxy$

2. $\forall x Rxc$, (c exist. constant (1))

3. Rdc (d generic constant.

4. $\exists y Rdy$ $I_\exists(3;\ c=y)$

5. $\forall x \exists y Rxy$ $I_\forall(2,4)$

6. $\forall x \exists y Rxy$ $E_\exists(1,2,5)$

Reconvene at 17.03

(1) $\forall x \exists y Rxy \overset{?}{\models} \exists y \forall x Rxy$ (other way around)

(2) $\forall x \forall y Rxy \overset{?}{\models} \forall x Rxx$

(3) $\exists x (Px \wedge Rx), \forall x (Px \to Qx) \overset{?}{\models} \exists x (Qx \wedge Rx)$

$\forall x \exists y Rxy \overset{?}{\models} \exists y \forall x Rxy$

1. $\forall x \exists y Rxy$ (given)
2. c, (universal constant)
3. $\exists y R_{cy}$ $E_\forall(1, x=c)$
4. R_{cd} $E_\exists(3)$, d exist. constant
5. $\forall x R_{xd}$ $I_\forall(2, 4)$
6. $\exists y \forall x R_{xy}$ $I_\exists(5)$
7. $\exists y \forall x Rxy$ $E_\exists(4, 6)$

This "proof" is <u>WRONG!</u>

Why? line 2
line 4
lines 5 get rid of
line 7 get rid of
(Remember what I said with this example!)

$\forall x \forall y Rxy \vDash \forall x Rxx$

1. $\forall x \forall y Rxy$ (given)
2. c (universal constant)
3. $\forall y Rcy$ $E_\forall(1, x=c)$
4. Rcc $E\forall(3, y=c)$
5. $\forall x Rxx$ $I_\forall(2,4)$

1.	$\forall x(Px \to Qx)$	(given)
2.	$\exists x(Px \wedge Rx)$	(given)
3.	$Pc \wedge Rc$	, $E_\exists(2, x=c)$, c exist. constant
4.	$Pc \to Qc$	$E_\forall(1, x=c)$
5	Pc	$E_\wedge(3)$
6	Rc	$E_\wedge(3)$
7	Qc	$E_\to(4,5)$
8	$Qc \wedge Rc$	$I_\wedge(6,7)$
9	$\exists x(Qx \wedge Rx)$	$I_\exists(8)$
10	$\exists x(Qx \wedge Rx)$	$E_\exists(2, 3, 9)$