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

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 $E_{\forall}(1)$
5 | Qc $E_{\forall}(2)$
6 | $Pc \wedge Qc$ $I_{\wedge}(4,5)$

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

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

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

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

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. $\exists y \forall x R_{xy}$ $E_\exists(4, 6)$

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

Why? line 2
line 4
line 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	$\forall y R_{cy}$	$E_\forall(1,\ x=c)$
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. $\exists x(Qx \wedge Rx)$ $E_{\exists}(2, 3, 9)$