11	$\{\forall y(Ray \to Rya)\}$	3, γ-EXPANSION
12	$\{Rab \to Rba\}$	11, γ-EXPANSION
13	$\{\neg Rab, Rba\}$	12, β-EXPANSION
14	$\{\exists xyz.\neg(Rxy \land Ryz \to Rxz)\}$	4, δ-EXPANSION
15	$\{\exists yz.\neg(Ray \land Ryz \to Raz)\}$	14, δ-EXPANSION
16	$\{\exists z.\neg(Rab \land Rbz \to Raz)\}$	15 δ-EXPANSION
17	$\{\neg(Rab \land Rba \to Raa)\}$	16, δ-EXPANSION
18	$\{Rab \land Rba\}$	17, α-EXPANSION
19	$\{\neg Raa\}$	17, α-EXPANSION
20	$\{Rab\}$	19, α-EXPANSION
21	$\{Rba\}$	19, α-EXPANSION
22	$\varnothing$	5,21 RESOLUTION

LET R BE A BINARY RELATION WHICH IS SYMMETRIC AND TRANSITIVE. USE RESOLUTION TO PROVE THAT R SATISFIES THE FORMULA

$\exists x \forall y. Rxy \to \forall xy. Rxy$

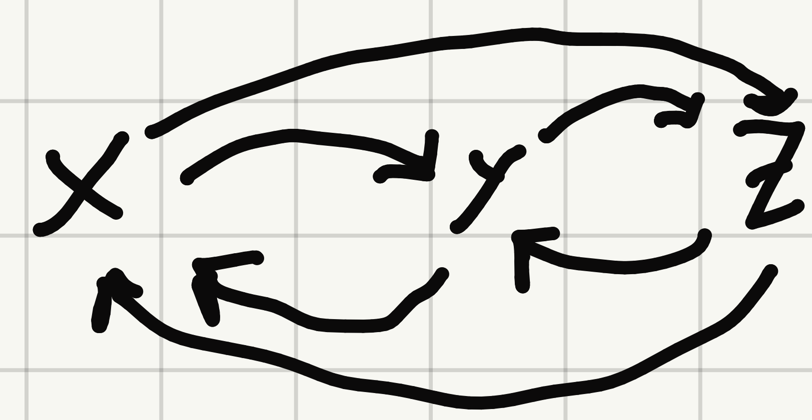
$\forall xy(xRy \to yRx), \forall xyz(xRy \wedge yRz \to \neg xRz) \vdash \exists x \forall y. Rxy \to \overset{\forall xy.}{Rxy}$

$\{\forall xy(Rxy \to Ryx). \forall xyz(Rxy \wedge Ryz \to \neg Rxz), \neg(\exists x \forall y. Rxy \to \forall xy. Rxy)\}$

- $\{\forall xy(Rxy \to Ryx)\} \mapsto \{Rxy \to Ryx\} \mapsto \{\neg Rxy, Ryx\}$
- $\{\forall xyz(Rxy \wedge Ryz \to \neg Rxz)\} \mapsto \{Rxy \wedge Ryz \to \neg Rxz\}$

  $\mapsto \{\neg(Rxy \wedge Ryz) \vee Rxz\} \mapsto \{\neg Rxy \vee \neg Ryx \vee Rxz\}$

  $\mapsto \{\neg Rxy. \neg Ryz, Rxz\}$



- $\{\neg(\exists x \forall y(Rxy \to (\forall xy\, Rxy)))\}$

  $\mapsto \{\forall x \exists y. \neg(Rxy \to (\forall zw\, Rzw))\}$

  $\mapsto \{\neg(Rxa \to (\forall zw\, Rzw))\} \mapsto \{Rxa \wedge \neg(\forall zw\, Rzw)\}$

  $\mapsto \{Rxa \wedge \exists zw. \neg(Rzw)\} \mapsto \{Rxa\}, \neg Rbc\}$

$CC(F) = \{\{\neg Rxy, Ryx\}, \{\neg Rxy. \neg Ryz, Rxz\}, \{\overset{a,y}{Rxa}\}, \{\neg Rbc\}\}$

A: $\dfrac{\{\neg Rxy, Ryx\}, \{Rxa\}}{\{Rax\}}$

B: $\dfrac{\{Rax\} \quad \{\neg RKy. \neg Ryz, Rxz\}}{\{Raa\}}$

C: $\dfrac{\{Raa\} \quad \{\neg Rbc\}}{\emptyset}$

(A) $C_1 = \{\neg Rxy, Ryx\}$ $E_1 = \{\neg Ryy\}$ $C_2 = \{Rxa\} = E_2$

$F_1 = \overline{E_1} \cup E_2 = \{Rxy, Rxa\}$ $S = [a/y]$

$F_2 = F_1 S = \{Rxa\}$

$R(C_1, C_2) = (C_1 \setminus E_1 \cup C_2 \setminus E_2) S = (\{Ryx\} \cup \emptyset)[a/y] = \{Rax\}$

(B) $C_1 = \{Rax\} = E_1$ $C_2 = \{\neg Rky, \neg Ryz, Rxz\}$ $E_2 = \{\neg Rxy, \neg Ryz\}$

$F_1 = E_1 \cup \overline{E_2} = \{Rax, Rky, Ryz\}$ $S_1 = [a/k]$

$F_2 = \{Rax, Ray, Ryz\}$ $S_2 = [x/y]$

$F_3 = \{Rax, Rxz\}$ $S_3 = [a/x]$

$F_4 = \{Raa, Raz\}$ $S_4 = [a/z]$

$F_5 = \{Raa\}$ $S = S_1 S_2 S_3 S_4$

$R(C_1, C_2) = \{Rxz\}[\frac{a}{k}, \frac{y}{y}, \frac{a}{x}, \frac{a}{z}] = \{Raa\}$

(C) $C_1 = \{Raa\} = E_1$ $C_2 = \{\neg Rbc\} = E_2$

$F_1 = \{Raa, Rbc\}$ $S_1 = [\frac{a}{b}]$

$F_2 = \{Raa, Rac\}$ $S_2 = [\frac{a}{c}]$

$F_3 = \{Raa\}$ $S = S_1 S_2$

$R(C_1, C_2) = \emptyset$