Q1

1) $\forall x . \forall y \, (\text{WOMAN}(x) \wedge \text{CHOCOLATE}(y) \rightarrow \text{LIKES}(x,y))$

$\equiv \{\neg \text{WOMAN}(x), \neg \text{CHOCOLATE}(y), \text{LIKES}(x,y)\}$ $\begin{pmatrix} I, N, \\ A, O, O \end{pmatrix}$

2) $\exists x \exists y (\text{CHOCOLATE}(y) \wedge \text{LIKES}(x,y) \rightarrow \neg \text{ADDICT}(x))$

$\equiv \{\neg \text{CHOCOLATE}(a), \neg \text{LIKES}(a,c), \neg \text{ADDICT}(a)\}$ $\begin{pmatrix} I, N, \\ E, O, O \end{pmatrix}$

3) $\exists x (\text{COFFEE}(y) \wedge \text{OWN}(x,y) \rightarrow \text{ADDICT}(x))$

$\equiv \{\neg \text{COFFEE}(y), \neg \text{OWN}(a,y), \text{ADDICT}(a)\}$ $\begin{pmatrix} I, N, \\ E, O, O \end{pmatrix}$

4) $\exists x \exists y ((\text{COFFEE}(y) \wedge \text{BUY}(x,y)) \rightarrow (\text{OWS}(x,y) \vee \text{OWN}(x,y)))$

$\equiv \{\neg \text{COFFEE}(b), \neg \text{BUY}(a,b), \text{OWS}(a,b), \text{OWN}(a,b)\}$

$\begin{pmatrix} I, N, \\ E, O, O \end{pmatrix}$

5) $\exists x (\text{COFFEE}(x) \wedge \text{BUYS}(\text{mary}, x))$

$\equiv \{\text{COFFEE}(b)\}$ and $\{\text{BUYS}(\text{mary}, b)\}$ (E, O)

6) $\{\text{CHOCOLATE}(\text{Milka})\}$

Goal: $\exists x (\text{WOMAN}(\text{MARY}) \rightarrow (\text{COFFEE}(x) \wedge \text{OWS}(\text{mary}, x)))$

Negated Goal: $\forall x . (\neg (\text{WOMAN}(\text{mary}) \rightarrow (\text{COFFEE}(x) \wedge \text{OWS}(\text{mary}, x))))$

$\equiv \{\text{WOMAN}(\text{mary})\}$ and

$\{\neg \text{COFFEE}(x), \neg \text{OWS}(\text{mary}, x)\}$

1) { ¬woman(x), ¬chocolate(y), likes(x,y) } Premise

2) { ¬chocolate(c), ¬likes(a,c), ¬addict(a) } Premise

3) { ¬coffee(y), ¬dwm(a,y), addict(a) } Premise

4) { ¬coffee(b), ¬buy(a,b), dws(a,b), dwm(a,b) } Premise

5) { coffee(b) } Premise

6) { buy(mary,b) } Premise

7) { chocolate(milka) } Premise

8) { woman(mary) } Negated goal

9) { ¬coffee(x), ¬dws(mary,x) } Negated goal

---

10) { ¬chocolate(y), likes(mary,y) } (1,8) { x ← mary }

11) { likes(mary, milka) } (10,7) { y ← milka }

12) { ¬likes(a, milka), ¬addict(a) } (2,7) { c ← milka }

13) { ¬addict(mary) } (11,12) { a ← mary }

14) { ¬coffee(y), ¬dwm(mary,y) } (3,13) { a ← mary }

15) { ¬dwm(mary, b) } (5,14) { y ← b }

16) { ¬coffee(b), ¬buy(mary,b), dws(mary,b) } (4,15) { a ← mary }

17) { ¬buy(mary,b), dws(mary,b) } (5,16)

18) { dws(mary, b) } (6,17)

19) { ¬dws(mary, x) } (5,9)

20) { } (18,19) { x ← b }

Q2

1) {s(Ali, Veli)} Premise

2) {c(Ali, Mehmet)} Premise

3) {c(Mehmet, Hasan)} Premise

4) {g(Hüseyin, Hasan)} Premise

5) {¬s(x,y), ¬s(x,z), s(y,z)} Premise

6) {¬c(y,x), ¬c(z,x), s(y,z)} Premise

7) {¬c(y,x), ¬c(x,z), g(y,z)} Premise

8) {¬g(y,z), c(y,x)} Premise

9) {¬g(y,z), c(x,z)} Premise

10) {¬s(Veli, Hüseyin), goal} (s(Hüseyin, Veli) → goal)

---

11) {c(Hüseyin, x)} (4,8) {y ∈ Hüseyin, z ∈ Hasan}

12) {c(x, Hasan)} (4,9) { " , " }

13) {¬c(Mehmet, z), g(Ali, z)} (2,7) {x ∈ Mehmet, y ∈ Ali}

14) {g(Ali, Hasan)} (3,7) {z ∈ Hasan}

15) {c(Ali, x)} (14,8)

16) {c(x, Hasan)} (14,9)

17) {¬c(z,x), s(Hüseyin, z)} (11,6) {y ∈ Hüseyin}

18) {s(Hüseyin, Ali)} (15,17) {z ∈ Ali}

19) {¬s(AV, z), s(VeV, z)} (1,5) {x∈AV, y∈VeV}

20) {s(VeV, HSseym)} (18,19) {z∈HSseym}

(NOTE: s(HSseym, AV) = s(AV, HSseym))

21) {goal} (10, 20)