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Resolution of FOL

1. It is crime for an American to sell weapons to hostile nations.

$$\begin{aligned} & \text{American}(x) \wedge \text{Weapon}(y) \wedge \text{Sells}(x, y, z) \\ & \wedge \text{Hostile}(z) \rightarrow \text{Criminal}(x) \\ & \neg [\text{American}(x) \wedge \text{Weapon}(y) \wedge \text{Sells}(x, y, z) \wedge \text{Hostile}(z)] \vee \text{Criminal}(x) \\ & \neg \text{American}(x) \vee \neg \text{Weapon}(y) \vee \neg \text{Sells}(x, y, z) \vee \neg \text{Hostile}(z) \vee \text{Criminal}(x) \end{aligned}$$

Nono has some missile

$$\exists x : \text{Owns}(\text{Nono}, x) \wedge \text{Missile}(x)$$

$$\text{Owns}(\text{Nono}, m_i) \wedge \text{Missile}(m_i)$$

All of its missiles were sold to it by Colonel West.

$$\forall x \text{ Missile}(x) \wedge \text{Owns}(\text{Nono}, x) \rightarrow \text{Sells}(\text{West}, x, \text{Nono})$$

$$\begin{aligned} & \neg \forall x (\text{Missile}(x) \wedge \text{Owns}(\text{Nono}, x)) \vee \text{Sells}(\text{West}, x, \text{Nono}) \\ & \neg \rightarrow \text{Missile}(x) \vee \neg \text{Owns}(\text{Nono}, x) \vee \text{Sells}(\text{West}, x, \text{Nono}) \end{aligned}$$

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Missiles are weapons:

Missile(x) \rightarrow Weapon(x)
 \neg Missile(x) \vee Weapon(x)

Prove

\neg Amer
 \vee T

An enemy of America counts
as 'hostile':

Enemy(x, America) \rightarrow Hostile

\neg Enemy(x, America) \vee Hostile

\neg Amer

T Wea

West, who is American...

American (West)

T Miss

T Sells

The Country Nono, an
enemy of America

Enemy(Nono, America)

T Mis

T Ow

T h

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• Prove: Criminal (west)

\neg Criminal (west)

\neg American(x) \vee \neg Weapon(y) \vee \neg Sells(x,y,z)

\vee \neg Hostile(z) \vee Criminal(x)

\neg Criminal(west)

\neg American(^{west}*) \vee \neg Weapon(y) \vee \neg Sells(x,y,z)

\vee \neg Hostile(z)

American(west)

\neg Weapon(y) \vee \neg Sells(west,y,z)

\vee \neg Hostile(z)

\neg Missile(x) \vee Weapon(x)

\neg Missile(y) \vee \neg Sells(west,y,z)

\vee \neg Hostile(z)

Missile(M₁)

\neg Sells(west,y,z) \vee \neg Hostile(z)

\neg Missile(x) \vee \neg Owns(Nono,x) \vee \neg Sells(west,x,y)

\neg Missile(M₁) \vee \neg Owns(Nono,M₁) \vee \neg Hostile(Nono)

Missile(M₁)

\neg Owns(Nono,M₁) \vee \neg Hostile(Nono)

\neg Hostile(Nono)

Owns(Nono,M₁)

\neg Enemy(x,America) \vee Hostile(x)

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Nono
7 Enemy (~~x~~, America) ~~is hostile~~

7 Enemy (Nono, America)

Empty