

b) HHP = Has Health Problem
 HC = High Cholesterol
 HBS = High Blood Sugar

$$\forall x (\exists y HHP(x, y)) \rightarrow HC(x) \vee HBS(x)$$

$$\forall x \neg (\exists y HHP(x, y)) \vee [HC(x) \vee HBS(x)]$$

$$\forall x (\forall y \neg HHP(x, y)) \vee HC(x) \vee HBS(x)$$

$$\forall x \neg HHP(x, y) \vee HC(x) \vee HBS(x)$$

c) DC = Don't drink coffee
 HBS = High Blood Sugar

$$\forall x \neg DC(x) \rightarrow \neg HBS(x)$$

$$\forall x DC(x) \vee \neg HBS(x)$$

$$DC(x) \vee \neg HBS(x)$$

d) WO = workout
 SL = Short life

$$\forall x (HC(x) \wedge \neg WO(x)) \rightarrow SL(x)$$

$$\forall x \neg (HC(x) \wedge \neg WO(x)) \vee SL(x)$$

$$\forall x [\neg HC(x) \vee WO(x)] \vee SL(x)$$

$$\neg HC(x) \vee WO(x) \vee SL(x)$$

$$e) \neg \exists x \text{Lazy}(x) \wedge \neg \text{WorksOut}(x)$$

$$\forall x \neg (\text{Lazy}(x) \wedge \text{WorksOut}(x))$$

$$\neg (\text{Lazy}(x) \wedge \text{WorksOut}(x))$$

$$f) \forall x \text{Eats}(\text{Donald}, x) \rightarrow \text{FF}(x)$$

$$\forall x \neg \text{Eats}(\text{Donald}, x) \vee \text{FF}(x)$$

$$\neg \text{Eats}(\text{Donald}, x) \vee \text{FF}(x)$$

$$g) \neg \text{Drinks}(\text{Donald})$$

$$h) \text{Lazy}(\text{Donald})$$

$$b) \text{Lazy}(\text{Donald})$$

$$\forall x \text{Eats}(\text{Donald}, x) \rightarrow \text{FastFood}(x)$$

So we know Donald is lazy and for all food if Donald eats it, it is fast food.

We know by a) $x = \text{Donald}$ so since

$$\forall y \text{Eats}(\text{Donald}, y) \rightarrow \text{FastFood}(y) \text{ then}$$

$$\exists z \text{HasHealthProblem}(\text{Donald}, z)$$

by b) Donald has either High Cholesterol or High Blood Sugar

by g) Donald does not 'drink' coke so by \hookrightarrow

he does not have high blood sugar so

by b) he has high cholesterol.