CS 271 - Introduction to Artificial Intelligence **Fall 2016**

HomeWork 6

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Problem 1 **Solution:**

Define cost function as how many constrains are violated. At beginning the cost is 4.

(a) In original expression, x and y could be same. Thus it should be revised as following:

$$\neg\exists x, y, n\ Person(x) \wedge Person(y) \wedge \neg(x = y) \wedge HasSS\#(x, n) \wedge HasSS\#(y, n)$$

(b) Yes, it is correct.

(c) No. In original expression, it said that everyone has every different SSN, which obviously incorrect.

$$\forall x, n\ Person(x) \wedge HasSS\#(x, n) \Rightarrow Digits(n, 9)$$

(d) Assume $SS\#(x)$ means x's social security number.

$$\neg\exists x, y\ Person(x) \wedge Person(y) \wedge (SS\#(x) = SS\#(y))$$

$$SS\#(Jhon) = SS\#(Mary)$$

$$\forall x\ Person(x) \Rightarrow Digits(SS\#(x), 9)$$

Problem 2 **Solution:**

(a) No

(b) $x = A, y = B, z = B$

(c) $x = David, father(x) = George$

(d) $x = g(u) = g(f(v))$

(e) $x = y = z = B$

Problem 3 **Solution:**

$$Alpine(Tony), Alpine(Mike), Alpine(John). \tag{1}$$
$$\forall x, Alpine(x) \Rightarrow (skier(x) \wedge \neg climber(x)) \vee (\neg skier(x) \wedge climber(x)) \tag{2}$$
$$\forall x, climber(x) \Rightarrow \neg like(x, Rain) \tag{3}$$
$$\forall x, skier(x) \Rightarrow like(x, snow) \tag{4}$$
$$\forall x, like(Jhon, x) \Rightarrow \neg like(Mike, x) \tag{5}$$
$$\forall x, \neg like(Jhon, x) \Rightarrow like(Mike, x) \tag{6}$$
$$\neg like(John, rain) \tag{7}$$
$$\neg like(John, snow) \tag{8}$$

Problem 4 **Solution:**

Problem 5 **Solution:**

Problem 6 **Solution:**

Problem 7 **Solution:**

Problem 8 **Solution:**