

Logic Homework 4 Solutions

1. Andrew loves police work, but neither Jane nor Bob is happy with his job, and he will stay in police work if and only if his supervisor gives him a raise and a commendation.

Let P-loves police work, H-happy with Andrew's job, S-stays in police work, R-supervisor gives him a raise, C-supervisor gives him a commendation.

So, we have that: x loves police work; x is happy with Andrew's job; x will stay in police work; supervisor gives x a raise; supervisor gives x a commendation.

Symbolized, this becomes

$$Pa \cdot (Hj \vee Hb) \cdot (Sa \equiv (Ra \cdot Ca))$$

2. Kathy will drown if and only if she cannot swim and falls into the water and no one rescues her, but she likes to climb trees and will not fall into the water.

Let D- will drown, S-can swim, F-falls into the water, R- gets rescued, C-likes to climb trees.

So we have that: x will drown; x cannot swim; x falls into the water; no one rescues x; x likes to climb trees; x will not fall into the water.

Symbolized, this becomes

$$Dk \equiv (\neg Sk \cdot Fk \cdot \neg Rk) \cdot (Ck \cdot \neg Fk)$$

3. There is no such thing as free lunch.

Let L-a free lunch. We have that x is a free lunch. Symbolized this becomes

$$\neg(\exists x)Lx$$

4. Not everything is without meaning.

Let M-without meaning. We have that x is without meaning. Symbolized, this becomes

$$(\exists x)Mx$$

5. Nothing in this consent agreement implies in any way that Hair Transplants Unlimited has engaged in deceptive advertising.

Let C-consent agreement, D-deceptive advertising. So we have that x is in consent agreement; x has engaged in deceptive learning. Symbolized, this becomes

$$(x)(\neg Cx \supset Dx)$$

$$(\exists x)(Cx \cdot \neg Dx)$$

6. Only things that should be discarded are in the wastebasket.

Let W- wastebasket, D-should be discarded. So we have that x that should be discarded; x are in the wastebasket. Symbolized, we have

$$(x)(Wx \supset Dx)$$

$$\neg(\exists x)(Wx \cdot \neg Dx)$$

7. There is nobody here who is not beautiful.

Let P-person her, B-beautiful. Symbolized, this becomes

$$(x)(Px \supset Bx)$$

or equivalently,

$$\neg(\exists x)(Px \cdot \neg Bx)$$

8. There is nothing that eats cat food and does not meow.

Let E-eats cat food, M-meows. Symbolized, this becomes

$$(x)(Ex \supset Mx)$$

or equivalently,

$$\neg(\exists x)(Ex \cdot \neg Mx)$$

9. There are cats that don't eat mice.

Let C-cats, M-mice. Symbolized, this becomes

$$(\exists x)(Cx \cdot \neg Mx)$$

10. There are some beautiful things that are not unappreciated.

Let B-beautiful, A-appreciated. Symbolized, this becomes

$$(\exists x)(Bx \cdot Ax)$$