

Student Information

Name: Kaan Karaçanta

ID: 2448546

Answer 1

Let $horse(x)$ be the predicate that x is a horse, $animal(x)$ be the predicate that x is an animal, $plant(x)$ be the predicate that x is a plant, $groom(x, y)$ be the predicate that x is groomed by some stableman y .

Then we can write the given sentences as follows:

$$\begin{aligned}\forall x(horse(x) \wedge animal(x) \Rightarrow \exists y(groom(x, y))) \\ \forall x(horse(x) \wedge plant(x) \Rightarrow \neg \exists y(groom(x, y)))\end{aligned}$$

We can write the conclusion and its negation as follows:

$$\begin{aligned}\forall x(horse(x) \wedge animal(x) \Rightarrow \neg plant(x)) \\ \exists x(horse(x) \wedge animal(x) \wedge plant(x))\end{aligned}$$

We can write the resolution as follows:

1.	$\{\neg horse(x), \neg animal(x), groom(x, f(x))\}$	Premise
2.	$\{\neg horse(z), \neg plant(z), \neg groom(z, f(z))\}$	Premise
3.	$\{horse(c)\}$	Negated Goal
4.	$\{animal(c)\}$	Negated Goal
5.	$\{plant(c)\}$	Negated Goal
6.	$\{\neg animal(c), groom(c, f(c))\}$	1, 3
7.	$\{\neg plant(c), \neg groom(c, f(c))\}$	2, 3
8.	$\{groom(c, f(c))\}$	4, 6
9.	$\{\neg groom(c, f(c))\}$	5, 7
10.	$\{\}$	8, 9

Since we added the negated goal to the set of premises and derived the empty clause, we can say that the conclusion ‘if the horse is an animal, then the horse is not a plant’ is valid.

Answer 2

(a)

1.	$\{T\}$	T
2.	$\{\neg S, \neg T, \neg R\}$	$\neg S \vee \neg T \vee \neg R$
3.	$\{\neg T, R\}$	$\neg T \vee R$
4.	$\{S, \neg R\}$	$S \vee \neg R$
5.	$\{\neg S, \neg R\}$	1, 2
6.	$\{R\}$	1, 3
7.	$\{S\}$	4, 6
8.	$\{\neg S\}$	5, 6
9.	$\{\}$	7, 8

(b)

1.	$\{T\}$	T
2.	$\{\neg S, \neg T, \neg R\}$	$\neg S \vee \neg T \vee \neg R$
3.	$\{\neg T, R\}$	$\neg T \vee R$
4.	$\{S, \neg R\}$	$S \vee \neg R$
5.	$\{\neg S, \neg R\}$	1, 2
6.	$\{\neg R\}$	4, 5
7.	$\{\neg T\}$	3, 6
8.	$\{\}$	1, 7

(c)

1.	$\{T\}$	T
2.	$\{\neg S, \neg T, \neg R\}$	$\neg S \vee \neg T \vee \neg R$
3.	$\{\neg T, R\}$	$\neg T \vee R$
4.	$\{S, \neg R\}$	$S \vee \neg R$
5.	$\{\neg S, \neg R\}$	1, 2
6.	$\{\neg R\}$	4, 5
7.	$\{\neg T\}$	3, 6
8.	$\{\}$	1, 7

Answer 3

1.	$\langle \neg Q, P, R \rangle$	Premise
2.	$\langle \neg P, R \rangle$	Premise
3.	$\langle \neg R, \neg Q \rangle$	Premise
4.	$\langle Q \rangle$	Premise
5.	$\langle P, R \rangle$	1, 4
6.	$\langle R \rangle$	2, 5
7.	$\langle \neg Q \rangle$	3, 6
8.	$\langle \rangle$	4, 7